



Taseko Prosperity Gold-Copper Project

Appendix 5-5-B



**Taseko Mines Limited
Prosperity Project
Vegetation Data Report
1997-1998**

for:

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Taseko Mines Limited Prosperity Project Vegetation Data Report 1997-1998

1.0 INTRODUCTION

This report describes the methods and documents the data collection for all vegetation mapping carried out by Madrone Consultants Ltd. in the mine site study area and the proposed transmission corridor for the Prosperity Project of Taseko Mines Ltd. in the Fish Lake area.

1.1 Corridor

The proposed transmission corridor runs from the Dog Creek Switching Station westwards for approximately 117 km to the mine site. An innovative mapping approach to identifying key ecological values was applied to the three kilometre wide transmission corridor, within which a 50 m right-of-way (ROW) was to be selected. Rather than map all ecosystems within this band following the provincial Terrestrial Ecosystem Mapping (TEM) standards, it was decided to focus more narrowly on sensitive ecosystems or ones of relatively high wildlife value. The decision to use this approach was based on a combination of ecological and practical management considerations. Senior ecologists flew the route in May 1997 and observed that the vegetation over a large percentage of the corridor was young, mesic pine forest resulting from extensive logging and fires. The assumption was made that, compared to many of the less extensively represented ecosystems such as wetlands, old forests, and grasslands, these young seral pine forests have:

- Relatively low plant species diversity.
- Low possibility of the occurrence of rare species.
- Generally low wildlife values.
- Relatively high tolerance for disturbance.

It thus seemed appropriate to focus attention on those areas that might be more sensitive to the development of a transmission corridor. These sites would therefore be of more ecological significance in ROW selection and in identifying necessary mitigation measures. In addition, from a practical perspective, the proponent will not have long-term jurisdiction over any of the areas outside of the selected ROW, so there was no reason to map these young pine stands to serve future forest or wildlife management objectives.

The mapping approach applied to the corridor was modeled on a Sensitive Ecosystem Inventory (SEI) that was carried out on the east coast of Vancouver Island and the Gulf Islands in 1993 and 1994 (Ward et al. 1998). This had the objective of identifying the

remnants of rare and fragile terrestrial ecosystems to encourage land-use decisions that would ensure the continued ecological integrity of these sites. Project ecologists felt that this approach, modified to suit interior conditions, would be appropriate for the collection of information required to make reliable decisions relating to site sensitivity, wildlife use, and development concerns.

The approach also borrowed from the existing provincial TEM mapping standards. While the broad SEI methodology was applied, it was fine-tuned and effectively updated to fit more closely with current TEM practices.

Ultimately, the mapping approach used on the corridor represents a blend of both SEI and TEM mapping, tailored to meet specific project goals. At this point in time, maps provided for the corridor are preliminary in nature and are not, therefore, included with this report. They will be finalized following a planned fieldwork program in July 1999.

1.2 Mine Site

Terrestrial Ecosystem Mapping (TEM) was conducted at a scale of 1:20,000 for over 18,000 hectares covering the general area around the proposed mine project, including the mine site, tailings, and storage areas.

Figure 1 (Figure 3-1 from project report) illustrates the TEM mapping area. The TEM area lies entirely within the Taseko Assessment Area (as defined in "Environmental Assessment Strategy and Methodology" draft for discussion, by Triton, January 31, 1998). It comprises all of the Fish Creek/Fish Lake catchment, the southern portions of both the Vick Creek and the Tête Angela Creek catchments, and portions of the Beece Creek/Big Onion Lake catchment area. The western boundary passes through Cone Hill, south to the mouth of Fish Creek, then runs along the Taseko River as far as Beece Creek. Here the boundary runs eastwards just south of Wasp Lake. The eastern boundary follows the watershed divide to the north and south of Tête Hill, and the northern boundary is approximately 2.5 kilometers north of Cone Hill. These boundaries were determined by ecological and practical considerations and through consultation with Regional Ministry of Environment, Lands and Parks (MELP) staff.

The ecosystem inventory completed within this area describes and maps the natural occurrence and range of variation in the vegetation communities and presents the information on a 1:20,000 TRIM base (Appendix 1). This information provided the framework for stratifying rare plant and wildlife inventories, permitting them to be focused in appropriate habitats and structural stages. It also provided the basis for the identification of potential impacts on ecosystems, including any relatively rare, uncommon, or sensitive ecosystems, and on wildlife habitats in and around the proposed development areas.

The mapping provides a sound basis for the development of management, monitoring, and mitigation and reclamation plans, which will minimize impacts on terrestrial resource values. The supporting detailed ecosystem database provides the necessary information for developing conceptual restoration plans utilizing native plants and natural communities. It also contains sufficient information for future more detailed restoration planning as the project progresses.

This information meets with environmental agency requirements, as per the Project Report Specifications.

Figure 1

1.3 Rare Plant Inventory

A rare plant inventory was carried out in conjunction with the TEM mapping. The objective was to survey the mine site and environs to determine whether provincially rare or threatened species of plants were present in the area, identify any potential impacts to these important elements, and to develop mitigation accordingly. Most rare species are not normally identified during routine vegetation sampling (i.e. ecosystem mapping could not adequately cover this component) for many reasons. Consequently, a specific effort was needed to identify if any of the possible red and blue-listed species for the area actually occur within the proposed development sites.

1.4 Personnel

The project team varied depending upon timing and skills required; however, the following personnel were the main contributors.

Project Planning, Reconnaissance Work, and Overall Project Review

Gill Radcliffe (GR)
Jan Teversham (JT)

Project Botanists

Mike Ryan (MR)
Terry McIntosh (TM)

Ecosystem Mappers

Jan Teversham (Mine Site)
Mike Ryan
Helen Reid (HR)

Field Sampling

All above
Ksenia Barton (KB)
Julie Williams (JW)

2.0 APPROACH AND METHODOLOGY

2.1 Corridor

2.1.1 *Sensitive Ecosystem Classification*

The original list of sensitive ecosystems chosen for the Vancouver Island project was the starting point for the basic legend. The SEI staff at the Conservation Data Centre (CDC) in Victoria was contacted to discuss the validity of this original legend. As no changes had subsequently been made during the SEI program on Vancouver Island, the original legend was taken and adapted to the Chilcotin study area. The categories that were initially used to identify sensitive ecosystems were wetlands, grasslands, sparsely vegetated units such as rock outcrops and talus slopes, and any mature or old forests along the length of the corridor. Second-growth forests were also identified if they were potentially red- or blue-listed ecosystems.

Red- and blue-listed ecosystems for each biogeoclimatic subzone and variant along the corridor were identified prior to mapping, using the CDC lists for rare or threatened ecosystems. Appendix 2 describes CDC classifications and Appendix 3 presents the CDC tracking lists for rare plant associations and plant species for the relevant Forest Districts.

2.1.2 *Data Sources*

The following resources were used to identify ecosystems:

- 1:15,000 scale colour aerial photographs of the entire corridor, taken in 1993 and 1995.
- 1:20,000 scale TRIM topographic maps.
- 1:20,000 scale soils maps.
- 1:20,000 forest cover maps.

In addition, available TEM maps were used. These had been completed for two of the 14 mapsheets covering the study area. At the western end, TEM mapping (from this project) with some full plot data was available for the MS and SBPS zones. Adjacent to the Fraser River, TEM mapping was available for the Dog Creek mapsheet (Lowry, 1998). Ecosystem labeling for this mapsheet was recently updated to follow current TEM standards, and this information was incorporated into the SEI mapping. Reconnaissance level fieldwork (see below) conducted by project ecologists has been the major source of field information for the remaining mapsheets. The Provincial Site Series Code List has been used for all descriptions; however, various other more detailed sources have also been used and these are listed in Table 1.

Table 1. DATA SOURCES FOR ECOSYSTEM DESCRIPTIONS OF THE TRANSMISSION CORRIDOR

Biogeoclimatic Unit	Data Sources
BGxh3	Iverson & Coupe 1996b, Lowry 1998
BGxw2	Iverson & Coupe 1996a, Lowry 1998
ESSFvx2	Coupe & Steen 1997 in an earlier draft form.
IDFdk3	Coupe & Steen 1997 in an earlier draft format, Roberts 1988; Lowry 1998
IDFdk4	Coupe & Steen 1997 in an earlier draft format Lowry 1998
IDFxm	Iverson & Coupe 1996c, Lowry 1998 Coupe & Steen in an earlier draft form
MSxv	TEM fieldwork, in mine site area; Coupe & Steen 1997 in earlier draft format
SBPSmk	Coupe & Steen 1997 in earlier draft format
SBPSxc	TEM fieldwork in mine site area, Roberts 1984, Coupe & Steen 1997 in earlier draft format.

2.1.3 Fieldwork and Personnel

Senior ecologists made an initial flight along the proposed corridor on May 29, 1997. They conducted preliminary fieldwork on July 29 to test the SEI ground truthing forms and initial polygon identification. Eleven sites were visited where data was collected. Subsequently, 37 polygons were visited on September 8 and 9, 1997, and SEI forms were completed. Visual air calls were also made. Representatives for the government agencies [Chris Swan, Ministry of Environment, Lands and Parks, (MELP) and Ray Coupé, Ministry of Forests, (MOF) from Williams Lake] accompanied project ecologists in the field to discuss ecosystems in the BG and IDF zones. Further reconnaissance level field data was collected in October 1998 by two vegetation ecologists and two wildlife ecologists.

2.1.4 Sampling Intensity

The transmission corridor was mapped at 1:20,000 using reconnaissance level fieldwork. A total of 381 field checks were made in the study area, consisting of five types of plots (Table 2). Plot field data collection is summarized in Appendix 4.

Table 2. NUMBER AND TYPE OF FIELD CHECKS

Plot Type	Number sampled
Full ecosystem (TEM)	18
Ground Inspection (TEM)	18
SEI plot	37
Visual ground check	76
Visual air check	236

2.1.5 Mapping Methodology

The 3 km wide corridor was identified on 1:15,000 airphotos, and all potentially sensitive polygons were delimited and numbered. In total, there are 1106 polygons. Polygon boundaries identified follow bioterrain breaks, and biogeoclimatic boundaries are

incorporated. The vegetation communities are named according to TEM mapping conventions and bioterrain site modifiers indicating atypical site conditions were also used as in TEM. Standard TEM ecosystem labeling was applied wherever available. Database construction for ecosystems follows a similar format to the TEM databases. The polygon number, biogeoclimatic subzone and variant, percentile, two-letter ecosystem code, structural stage, some site modifiers, and data source have all been entered onto an Excel database (Appendix 5). Codes used in the database are shown in Appendix 6. This database is only in draft form as field checking of the mapping will be carried out in June 1999. Descriptions of all ecosystems mapped along the corridor are found in Appendix 7.

2.1.6 Data and Mapping Limitations

Limited detailed ecosystem data were collected along the corridor. The full ecosystem plots are limited to two mapsheets out of the total 14. Those on the Dog Creek mapsheet were collected as part of another project. Hence the TEM labeling should be considered preliminary; however, the general categories into which the polygons have been grouped for various interpretations should be valid.

2.2 Mine Site Study Area: TEM

2.2.1 Ecosystem Classification

Ecosystem classification and mapping follow *Standards for Terrestrial Ecosystem Mapping for British Columbia* (Ecosystems Working Group 1995) and the subsequent 1996 addenda. These were the RIC standards in place at the inception of the mapping process.

There are three levels of classification applied. From the broadest to the most detailed they are ecoregion units, biogeoclimatic units, and ecosystem units.

Ecoregion Classification is a very broad classification system that describes large landscape units based on macroclimatic processes and physiography. There are five levels of generalization of which the lowest level, that of Ecosection, is most applicable for this study. The whole study area lies within the Chilcotin Plateau Ecosection (CHP), which is part of the Fraser Plateau Ecoregion.

Biogeoclimatic Ecosystem Classification (BEC) describes variations in vegetation and the related climate within ecosections. The broadest level of the classification is the zone, which is a large geographic area that experiences the same regional climate. There are about 100 subzones identified in British Columbia at present. This study area lies at the boundary of two zones. The Montane Spruce (MS) and the Sub-boreal Pine Spruce (SBPS) zones are further subdivided into subzones which form the basic unit of the classification system. The two zones identified are each represented by only one subzone within the study area.

- The Sub-boreal Pine Spruce very cold dry subzone (SBPSxc) is the largest subzone of the SBPS. It occurs along the leeward side of the Coast Mountains at elevations between approximately 1100 and 1500 metres in the vicinity of the mine site.
- The Montane Spruce very dry very cold subzone (MSxv) occurs primarily within the Cariboo region on the plateau landscape to the west of the Fraser River. Elevations range from approximately 1400 to 1700 metres near Taseko Lake.

Ecosystem Units are identifiable plant groupings that grow in response to local variation in soil moisture and nutrients as well as topographical and disturbance history variations. Within British Columbia most ecosystems are described by the site series classification developed over many years by the Ministry of Forests. These site series describe all land areas that can support specific climax vegetation types. In addition, there are a number of sparsely vegetated units not classified on the basis of vegetation, such as cliffs, as well as units of anthropogenic origin, such as cultivated areas.

2.2.2 Data Sources

Earlier 1:50,000 scale mapping (McKenzie 1994), completed as part of the Chilcotin Ranges biophysical mapping project, was obtained from MELP. This covered the southern two-thirds of the study area. Habitat units were identified and mapped using earlier mapping symbology. The resulting map generally reflects the range of structural stages of the predominantly mesic forests, together with the abundance of wetlands and the scattered occurrence of shallow soils.

Field data collected for the project prior to 1996 had not always been precisely located on photographs, and most could therefore not be used in the mapping process. However, eleven original plots were verified in the field and could be utilized.

Polygons delimited on 1:20,000 soil maps developed for this project were used as the initial basis for ecosystem mapping. Topographic maps, highlighted where gradients exceeded 25%, were used to pinpoint significant warm and cold aspect slopes. Forest cover maps at 1:20,000 for the study area were used to assist in identifying some ecosystems and structural stages of forested stands.

Unpublished data for the SBPSxc and MSxv subzones were obtained from the Ministry of Forests, Cariboo Region, to aid in the identification of forested ecosystems. Roberts (1984) was used to identify wetlands in the SBPSxc. Parish et al. (1996), Roberts (unpublished), Roberts (1983), and Roberts (1983a) were all used as field identification texts. The sources used for common and scientific nomenclature were the *Vascular Plants of British Columbia*, Douglas, G.W., et al. (1989-1994), and Schofield (1992) for mosses.

2.2.3 Fieldwork and Personnel

A reconnaissance trip to the mine site was made by senior ecologists on May 27 and 28, 1997. This initial trip served several objectives: familiarization with the project area was needed in order to plan subsequent field trips; the validity of previous fieldwork for use in ecosystem mapping was ascertained; some preliminary data collection was carried out.

The main field trip took place from July 22 to 28, 1997. Data collection in the field followed the draft *Field Manual for Describing Terrestrial Ecosystems* (MOF 1996). Two two-person crews carried out data collection. The teams each combined a vegetation ecologist with a technical assistant collecting supporting information, including wildlife data collection. Two botanists conducted a rare plant inventory and their data is incorporated into the subsequent mapping. The original mapping boundary on the west side ran along the north-south basalt scarp above the Taseko River. This was later extended down to the river, following input from MELP. An additional short field trip to check this area was made in October 1998 by two vegetation ecologists and two wildlife specialists.

2.2.4 Sampling Intensity

The level of field checking conducted for this entire mine site study area is presented in Table 3. Project Report Specifications required that the TEM area be mapped with a level 4 sampling intensity. This translates to field checking between 18% and 25% of mapped polygons (i.e. 5:20:75 for full, ground, and visual plots respectively). Field sampling conducted in fact exceeds these requirements, as a sampling intensity of 33% was achieved over the study area. This is equivalent to a level 3 survey intensity. In addition, the level of detail collected in field checking also exceeds the standards with a higher proportion of detailed plots and ground inspections than necessary.

Table 3. DATA COLLECTION FOR THE MINE SITE AREA TEM. Comparison of required and actual sampling.

Plot Types	18% Sampling of 1252 Polygons	25% Sampling of 1252 Polygons	Achieved Sampling of 1252 Polygons
Full	11	16	33 plots in 31 polygons
Ground	45	63	168 plots in 128 polygons
Visual / Air	169	234	222 plots in 142 polygons
Total # of plots	225	313	423
Total # polygons checked			301 (33% sampling)

The sampling program was designed to ensure adequate representation of the natural diversity within the study area. In addition, an effort was made to concentrate more sampling in any areas that appeared to have special wildlife values, in habitat types expected to be especially sensitive to disturbance, and in the areas expected to be directly impacted by the proposed developments. Plot locations are shown on the 1:20,000 ecosystem map in Appendix 1. Data from the 33 detailed plots are attached in digital form in Appendix 8. Appendix 9 is a general summary of all plot data together with an explanation of the codes used.

In the proposed mine site, tailings, and waste rock areas a total of 229 plots were completed out of 500 polygons (delineated by the mine site footprint overlay, therefore some TEM polygons are double or triple counted where linear footprint polygons intersect TEM polygons at multiple points). Of these plots, 19 are detailed, 94 are grounds, and 116 are visual checks. This results in a 46% sampling intensity in these areas. This meets the sampling requirements of a level 3 survey (26-49%, field sampling) and substantially exceeds the level 4 requirement (18%-25% with 5:20:75 respectively for full, ground and visual plots) of the Project Report Specifications.

Table 4. DATA COLLECTION WITHIN THE PROPOSED MINE SITE BOUNDARIES. Comparison of required and actual sampling.

Plot Types	18% Sampling of 500 Polygons	25% Sampling of 500 Polygons	Achieved Sampling of 500 Polygons
Full	5	6	19/19
Ground	18	25	94/84
Visual / Air	68	94	116/78
Total # of plots	91	125	229 (46% sampling)
Total # polygons checked			181 (36% sampling)

2.2.5 Mapping Methodology

Ecosystem mapping used pre-existing soils/terrain polygons marked on a 1:20,000 orthophoto. A separate database provided bioterrain labels for these polygons. Lines were transferred onto the 1:15,000 photographs used as a base for the TEM mapping. Polygons were then further subdivided to identify variations in ecosystems, structural stages, and aspect. The polygon database is attached in digital form in Appendix 10. Symbology used is explained in Appendix 6.

Labeling methodology of map units is according to the 1995 TEM standards and 1996 addenda (Resources Inventory Committee, 1995 and 1996). Each ecosystem is labeled by a two-letter symbol that is equivalent to one recognized BEC Site Series for most sites. This labeling is according to the Provincial Site Series Codes, which are linked to the forested Site Series identified in the Cariboo Forest Region Field Guide (Steen and Coupé, 1997). Wetland site series numbers refer to the wetland classification developed by Anna Roberts (1984). Other shrub and herb dominated ecosystems identified but not described or named in the existing literature have been assigned appropriate two letter symbols specifically for this project. Sparsely vegetated, non-vegetated, and anthropogenic units follow codes listed in the May 1997 edition of Appendix K of the 1996 addenda (Resources Inventory Committee, 1996).

Where a site series is mapped in a non-typical situation, site modifiers are added to further define the ecosystem. Structural stages describe the current vegetation stage by a seven level system as identified in Hamilton (1988). The ecosystem database developed to support the mapping includes additional information not shown in the map labels, including site disturbance history. The map and legend are attached in Appendix 1. Detailed descriptions of ecosystems mapped at the mine site are found in Appendix 11.

2.2.6 Data and Mapping Limitations

All ecosystems mapped have been observed and identified in the field.

In some areas of alternating wetlands and forests where terrain is hummocky, there are probably five or six ecosystems occurring within one polygon. Labeling convention dictates that a maximum of three ecosystems can be named per polygon. Hence the most common

ecosystems will be named, but those that are the least well represented in these polygons will not be represented in the labels.

TEM plot data was collected at all sites in the rare plant inventory. Although some of these sites are too small to map at 1:20,000, any site-specific features of potential interest were noted and were considered in subsequent impact assessments. Non-forested dry slopes (KG) are linear in nature and are often relatively small. Although they are mapped, they occur more frequently than shown. A similar limitation occurs with the mapping of cliff units.

A significant area to the north of Tête Hill has been mapped as one of the ecosystems listed as rare by the Conservation Data Centre for B.C. (CDC). This is Site Series 05 PI-Trapper's tea-Crowberry. Two plots were completed in this type, and based on this limited data, all gentle, northerly aspect slopes within the MSxv in that vicinity have been mapped as this ecosystem. While more fieldwork would determine the validity of this decision, none of the polygons mapped as this unit occur within or near the proposed development areas.

The location of the biogeoclimatic boundary between the MSxv and SBPSxc subzones in the study area is generally based on the 1:250,000 map and specifically, on field data. Because of the very gentle terrain at approximately 1,500 metres over much of the study area, the ecological boundary is unclear in places and many areas appear transitional in species composition. In addition, the mesic forests within the SBPSxc on the steep, cold aspect slopes to the west of Fish Lake appear to be very similar to mesic spruce stands within the MSxv and have been assigned labels to reflect this.

Ecosystem mapping reflects the visual information on air photos updated to portray conditions extant in any particular location at the time of conducting most of the fieldwork, in 1997. Thus forests, which had been recently clearcut at that time, are indicated, but more recent changes will not be reflected. The cutblock boundaries around Cone Hill were located from a small-scale forest development map, which was digitized and enlarged to 1:20,000. This may limit the accuracy of the boundaries of recently logged areas.

2.3 Mine Site Study Area: Rare Plants Inventory

2.3.1 Introduction

Rare and threatened species status is determined by the B.C. Conservation Data Centre (CDC) and species are categorized as red-listed or blue-listed (see Appendix 2). Red-listed species are indigenous species that are considered extirpated, endangered, or threatened in British Columbia. Blue-listed species include any indigenous species considered to be vulnerable in British Columbia.

The purpose of this inventory was to field survey the mine site and environs to determine whether provincially rare or threatened species of plants are present in the area, identify any potential impacts to these important elements, and to develop mitigation accordingly. Most rare species are not normally identified during routine vegetation sampling (i.e. ecosystem mapping could not adequately cover this component) for many reasons. Consequently, a specific effort was needed to identify if any of the possible red and blue-listed species for the area actually occur within the proposed development sites.

2.3.2 Data Sources

A list of red and blue-listed plants previously reported from the Chilcotin Forest District (within which the study area is located) was obtained from the CDC. This is found in Appendix 3. Existing occurrence records were also obtained. From this information, a listing of 42 species that could potentially occur within the study area boundaries was compiled.

Available information on the ecology, habitat, and distribution of each of these species was then reviewed and summarized. Main information sources were Hitchcock (1973), Douglas et al. (1989-1994), MacKinnon et al (1992), and Parish et al (1996). Each species was assessed for probability of occurrence within the study area. This information assisted in stratifying the sampling on the basis of habitats and helped to identify the best time windows for sampling. Identification aids for the species that could potentially occur were then developed. Key morphological characteristics of the reported red- and blue-listed species were identified based on existing literature and summarized. Summary tables are in Appendix 12.

Available herbarium specimens of many of these species were located at the University of British Columbia, University of Victoria, and the Royal B.C. Museum. Specimens were examined and photographed in order to assist in field identification. Photographs were also annotated as field identification aids.

2.3.3 Fieldwork and Personnel

Based on available habitat information, a number of sites within the study areas were identified that had the potential to support rare species. These areas included non-forested vegetation comprised of open grasslands on south or west-facing slopes associated with hills, eskers, and steep creek channels; grass- and herb-dominated and sparsely vegetated basalt bluffs and ridges; open and semi-forested wetlands (including sedge-dominated, willow-dominated, and birch-dominated wetlands), and small ponds. In addition, old forests dominated by spruce and forests associated with limited terrain features such as floodplains were selected for particular effort.

Fieldwork, conducted by two experienced botanists, was undertaken in two phases. Phase 1 was from June 8 to June 15 1997, and Phase 2 from August 8 to 15, 1997. These times were chosen because they would best enable the botanists to investigate the flora over the growth seasons of late spring and summer. Wetland communities were studied more extensively during Phase 2 as most of the dominant sedges and grasses were more easily identified (by flowers and fruit) at that time.

Daily fieldwork involved walking transects that intersected as many of the key habitats as possible. Site information, a species list, and associated cover values of all vascular plants were completed for each habitat. Specimens of unknown plant species were collected and identified later using Douglas, Straley, and Meidinger (1989 - 1994). The location of the rare plant inventory plots is shown in Figure 2 (Figure 3-4 in the Project Report).

Following fieldwork, subsequent laboratory identification and voucher specimen verification was conducted by two project botanists. This involved microscopic examination and comparison with existing herbarium specimens to confirm identifications. A list of all plants identified was compiled (Appendix 13).

INSERT FIGURE 2

2.3.4 Sampling Intensity

Altogether, 89 sites were visited and carefully examined by the project botanists. Sites with the greatest likelihood of supporting rare plants, as indicated above, were sampled disproportionately. Sites with a very low likelihood of supporting the species of interest, including many of the young pine forests, received only a very low sampling effort.

2.3.5 Data and Field Limitations

Relatively rare species are, by their nature, poorly documented, especially in parts of the province where the human population density is low. Consequently, the information base on which this work is developed, including the categorization of species as red or blue-listed, is quite limited.

Timing of the fieldwork to cover two separate periods was done to ensure species with short above-ground phases were unlikely to be missed, as well as to facilitate identification of different species groups. There is always a possibility that some rare species may have been overlooked. However, the fieldwork for this project was quite thorough, and at this stage of planning, exceeds any previously documented levels of effort for a project of this type in B.C. It is believed quite unlikely therefore that any plant currently categorized as provincially rare or threatened occurs within or adjacent to the mine footprint area.

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Appendix 1
MINE SITE STUDY AREA MAP AND LEGEND

insert Map Pocket



Appendix 2

CONSERVATION DATA CENTRE: PROVINCIAL AND GLOBAL RANKINGS

Each “element” (for example, a species) on the Conservation Data Centre’s list is ranked using the system developed over the past 20 years by the Nature Conservancy. This system is now in use in three Canadian provinces, all U.S. states and a number of Latin American countries. Most government agencies within these jurisdictions have also adopted this ranking system.

Each element is ranked at two levels: global (G) and provincial, or “subnational” (S). The global rank is based on the status of the element throughout its entire range whereas the provincial rank is based solely on its status within British Columbia. The global rank is established by a biologist assigned to that element by the Nature Conservancy; the provincial rank cannot exceed the global rank.

The status of an element is indicated on a scale of one to five; the score is based primarily on the number of extant occurrences of the element, but other factors such as abundance, range, protection, and threats are also considered if the information is available. Generally speaking, the Conservation Data Centre will track only those animals with ranks of 1-3 and those plants of 1-2. In addition to the ranks 1-5, there are several letter ranks; all are defined below.

1 = Critically imperiled because of extreme rarity (5 or fewer extant occurrences or very few remaining individuals) or because of some factor (s) making it especially vulnerable to extirpation or extinction.

2 = Imperiled because of rarity (typically 6-20 extant occurrences or few remaining individuals) or because of some factor (s) making it vulnerable to extirpation or extinction.

3 = Rare or uncommon (typically 21-100 occurrences); may be susceptible to large-scale disturbances; e.g. may have lost extensive peripheral populations.

4 = Frequent to common (greater than 100 occurrences); apparently secure but may have a restricted distribution; or there may be perceived future threats.

5 = Common to very common; demonstrably secure and essentially ineradicable under present conditions.

H = Historical occurrence; usually not verified since 1950, but with the expectation that it someday may be rediscovered.

X = apparently extinct or extirpated, without the expectation that it will be rediscovered.

U = Status uncertain, often because of low search effort or cryptic nature of the element; uncertainty spans a range of 4 or 5 ranks.

R = Reported from the province, but without persuasive documentation for either accepting or rejecting the report.

RF = Reported in error, but this error has persisted in the literature.

? = No information is available or the number of extant occurrences is estimated.

A = An element (usually an animal) that is considered accidental or casual in province; a species that does not appear on an annual basis.

E = An exotic or introduced species to the province.

Z = Occurs in the province but as a diffuse, usually moving population; difficult or impossible to map static occurrences.

In addition to the above ranks, there are four letter qualifiers sometimes used in conjunction with them:

T = Rank associated with a subspecies or variety; the derivation is identical to that of G and S ranks.

B = Breeding; the associated rank refers to breeding occurrences of mobile animals.

N = Non-breeding; the associated rank refers to non-breeding occurrences of mobile animals.

Q = Taxonomic level of the element is unclear or in question.

Blue List - This list includes any indigenous species or subspecies (taxa) considered to be Vulnerable in B.C.

Blue-listed taxa are at risk, but are not Extirpated, Endangered or Threatened.

Endangered taxa are facing imminent extirpation or extinction.

Extirpated taxa no longer exist in the wild in B.C., but do occur elsewhere.

Red List - This list includes any indigenous species or subspecies (taxa) considered to be Extirpated, Endangered, or Threatened in British Columbia.

Red-listed taxa include those that have been, or are being, evaluated for these designations.

Threatened taxa are likely to become endangered if limiting factors are not reversed.

Vulnerable taxa are of special concern because of characteristics that make them particularly sensitive to human activities or natural events.



Appendix 3

CDC TRACKING LISTS

1. Rare Vascular Plants: Chilcotin Forest District
2. Rare Plant Associations: Chilcotin Forest District
3. Rare Plant Associations: Williams Lake Forest District
4. Rare Plant Associations: 100 Mile House Forest District

B.C. Conservation Data Centre: Rare Vascular Plant Tracking List
Chilcotin Forest District
 April 26, 1999

SCIENTIFIC NAME	COMMON NAME	GLOBAL RANK	PROVINCIAL RANK	PROVINCIAL LIST
APOCYNUM MEDIUM	WESTERN DOGBANE	G5?	S2S3	BLUE
ARABIS LEMMONII VAR	LEMMON'S ROCKCRESS	G5T4?	S1?	BLUE
DREPANOLOBA				
ARABIS LIGNIFERA	WOODY-BRANCHED ROCKCRESS	G5	S2S3	BLUE
ARNICA CHAMISSONIS SSP INCANA	MEADOW ARNICA	G5T?	S1?	BLUE
ATRIPLEX ARGENTEA SSP ARGENTEA	SILVERY ORACHE	G5T5	S1	RED
BOTRYCHIUM ASCENDENS	UPSWEPT MOONWORT	G3	S1?	BLUE
BOTRYCHIUM SIMPLEX	LEAST MOONWORT	G5	S1?	BLUE
CAMISSONIA BREVIFLORA	SHORT-FLOWERED EVENING-PRIMROSE	G5	SH	RED
CAREX HELEONASTES	HUDSON BAY SEDGE	G4	S2S3	BLUE
CAREX HYSTERICINA	PORCUPINE SEDGE	G5	S1?	BLUE
CAREX SAXIMONTANA	ROCKY MOUNTAIN SEDGE	G5	S2S3	BLUE
CAREX SIMULATA	SHORT-BEAKED SEDGE	G5	S2S3	BLUE
CAREX XERANTICA	DRY-LAND SEDGE	G5	S2S3	BLUE
CASTILLEJA TENUIS	HAIRY OWL-CLOVER	G5	S1	RED
CHENOPODIUM DESICCATUM	NARROW-LEAVED GOOSEFOOT	G5	S2	RED
CREPIS OCCIDENTALIS SSP PUMILA	WESTERN HAWKSBEARD	G5T5	S1	RED
DRABA ALPINA	ALPINE DRABA	G4	S1?	BLUE
DRABA DENSIFOLIA	NUTTALL'S DRABA	G5	S1?	BLUE
DRABA GLABELLA VAR GLABELLA	SMOOTH DRABA	G4G5T4	S2S3	BLUE
DRABA RUAXES	COAST MOUNTAIN DRABA	G3	S2S3	BLUE
DRABA VENTOSA	WIND RIVER DRABA	G3	S1?	BLUE
EPILOBIUM CILIATUM SSP WATSONII	PURPLE-LEAVED WILLOWHERB	G5T?	S2S3	BLUE
ERYTHRONIUM MONTANUM	WHITE GLACIER LILY	G4	S2S3	BLUE
FESTUCA MINUTIFLORA	LITTLE FESCUE	G5	S1?	BLUE

GALIUM MULTIFLORUM	SHRUBBY BEDSTRAW	G5	S1	RED
JUNCUS ALBESCENS	WHITISH RUSH	G5	S2S3	BLUE
JUNCUS REGELII	REGEL'S RUSH	G5	S2S3	BLUE
MELICA SPECTABILIS	PURPLE ONIONGRASS	G5	S2S3	BLUE
MONTIA CHAMISSOI	CHAMISSO'S MONTIA	G5	S1?	BLUE
MUHLENBERGIA GLOMERATA	MARSH MUHLY	G5	S2S3	BLUE
PELLAEA ATROPURPUREA	PURPLE CLIFF-BRAKE	G5	S1?	BLUE
POLEMONIUM BOREALE	NORTHERN JACOB'S-LADDER	G5	S2S3	BLUE
POLEMONIUM CAERULEUM SSP AMYGDALINUM	TALL JACOB'S-LADDER	G?T?	S1?	BLUE
POLEMONIUM ELEGANS	ELEGANT JACOB'S-LADDER	G4	S2S3	BLUE
POTENTILLA DIVERSIFOLIA VAR PERDISSECTA	DIVERSE-LEAVED CINQUEFOI	G5T4	S2S3	BLUE
POTENTILLA NIVEA VAR PENTAPHYLLA	FIVE-LEAVED CINQUEFOIL	G5T4	S2S3	BLUE
POTENTILLA OVINA	SHEEP CINQUEFOIL	G4	S1?	BLUE
RANUNCULUS PEDATIFIDUS	BIRDFOOT BUTTERCUP	G5	S2S3	BLUE
SCIRPUS ROLLANDII	SMALL DEER-GRASS	G3Q	S2S3	BLUE
SCOLOCHLOA FESTUCACEA	SPRANGLE-TOP	G5	S2S3	BLUE
SENECIO PLATTENSIS	PLAINS BUTTERWEED	G5	S2S3	BLUE

B.C. Conservation Data Centre: Rare Plant Association Tracking List
Chilcotin Forest District
April 26, 1999

This list is incomplete, especially with respect to wetland, alpine, and grassland plant associations. Please note that the ranks below reflect the rarity of plant association occurrences that have not been disturbed by humans or domestic animals, and are in a natural or "climax" state. Some plant associations are often confused with more common successional plant associations (e.g. *Pseudotsuga menziesii* / *Gaultheria shallon*), or they may occur commonly in degraded conditions (e.g. *Elymus spicatus* - *Koeleria macrantha*), but undisturbed occurrences are rare. Please consult our website or contact the CDC for more information on rare plant associations

SCIENTIFIC NAME	COMMON NAME	BEC UNIT*	PROV RANK	PROV LIST
ARTEMISIA CAMPTISTRIS / STIPA CURTISETA	PACIFIC SAGEBRUSH / SHORT-AWNED PORCUPINE GRASS		S2	RED
DISTICHLIS STRICTA – PUCCINELLIA NUTTALLIANA	SALTGRASS – ALKALIGRASS		S3	BLUE
ELYMUS SPICATUS - BALSAMHORIZA SAGITTATA	BLUEBUNCH WHEATGRASS – BALSAMROOT		S2S3	BLUE
ELYMUS SPICATUS - KOELERIA MACRANTHA	BLUEBUNCH WHEATGRASS – JUNEGRASS		S2	RED
GLYCERIA BOREALIS FEN	NORTHERN MANNAGRASS FEN		S3	BLUE
JUNCUS BALTICUS - POTENTILLA ANSERINA	BALTIC RUSH – SILVERWEED		S2	RED
LEDUM GROENLANDICUM / SPHAGNUM SPP	LABRADOR TEA / SPHAGNUM		S2S3	BLUE
PICEA ENGELMANII X GLAUCA / PLEUROZIUM - BRACHYTHECIUM	HYBRID WHITE SPRUCE / FEATHERMOSS - BRACHYTHECIUM		S3	BLUE
PINUS CONTORTA / FESTUCA ALTAICA STEREOCAULON	LODGEPOLE PINE / ALTAI FESCUE / STEREOCAULON		S3	BLUE
PINUS CONTORTA / LEDUM GLANDULOSUM / EMPETRUM NIGRUM	LODGEPOLE PINE / TRAPPER'S TEA / CROWBERRY		S2	RED

POPULUS TREMULOIDES / STIPA RICHARDSONII - GEUM TRIFLORUM	TREMBLING ASPEN / SPREADING NEEDLEGRASS - OLD MAN'S WHISKERS	S2	RED
PSEUDOTSUGA MENZIESII / ELYMUS SPICATUS - CALAMAGROSTIS RUBESCENS	DOUGLAS-FIR / BLUEBUNCH WHEATGRASS - PINEGRASS	S3	BLUE
PSEUDOTSUGA MENZIESII / JUNIPERUS COMMUNIS / CLADONIA	DOUGLAS-FIR / COMMON JUNIPER / CLADONIA	S2	RED
PSEUDOTSUGA MENZIESII / JUNIPERUS COMMUNIS / PENSTEMON	DOUGLAS-FIR / COMMON JUNIPER / PENSTEMON	S2S3	BLUE
PSEUDOTSUGA MENZIESII / JUNIPERUS SCOPULORUM - ARTEMISIA FRIGIDA	DOUGLAS-FIR / ROCKY MOUNTAIN JUNIPER - PASTURE SAGE	S3	BLUE
PSEUDOTSUGA MENZIESII / PLEUROZIUM - HYLOCOMIUM	DOUGLAS-FIR / FEATHERMOSS – STEPMOSS	S3	BLUE
PSEUDOTSUGA MENZIESII / ROSA WOODSII / ARALIA NUDICAULIS	DOUGLAS-FIR / PRICKLY ROSE / SARSAPARILLA	S2S3	BLUE
SCIRPUS LACUSTRIS MARSH	BULRUSH MARSH	S3	BLUE
SELAGINELLA Densa - ELYMUS SPICATUS CLADONIA	SELAGINELLA - BLUEBUNCH WHEATGRASS / CLADONIA	S3	BLUE
SPOROBOLUS CRYPTANDRUS - STIPA COMATA	SAND DROPSEED - NEEDLE-AND-THREAD GRASS	S2	RED
STIPA RICHARDSONII	SPREADING NEEDLEGRASS	S2	RED

B.C. Conservation Data Centre: Rare Plant Association Tracking List
Williams Lake Forest District
April 26, 1999

This list is incomplete, especially with respect to wetland, alpine, and grassland plant associations. Please note that the ranks below reflect the rarity of plant association occurrences that have not been disturbed by humans or domestic animals, and are in a natural or "climax" state. Some plant associations are often confused with more common successional plant associations (e.g. *Pseudotsuga menziesii* / *Gaultheria shallon*), or they may occur commonly in degraded conditions (e.g. *Elymus spicatus* - *Koeleria macrantha*), but undisturbed occurrences are rare. Please consult our website or contact the CDC for more information on rare plant associations

SCIENTIFIC NAME	COMMON NAME	BEC UNIT*	PROV RANK	PROV LIST
ALNUS / ATHYRIUM	ALDER / LADY FERN		S2?	RED
ARTEMISIA CAMPTOSTRIS / STIPA CURTISETA	PACIFIC SAGEBRUSH / SHORT-AWNED PORCUPINE GRASS		S2	RED
ARTEMISIA TRIDENTATA / ELYMUS SPICATUS	BIG SAGE / BLUEBUNCH WHEATGRASS		S2	RED
BETULA GLANDULOSA - RIBES OXYACANTHOIDES	SCRUB BIRCH - NORTHERN GOOSEBERRY		S2	RED
CAREX ATHERODES FEN – MARSH	AWNED SEDGE FEN - MARSH		S3	BLUE
CAREX LASIOCARPA / DREPANOCLADUS ADUNCUS	SLENDER SEDGE / DREPANOCLADUS MOSS		S3	BLUE
DISTICHLIS STRICTA – PUCCINELLIA NUTTALLIANA	SALTGRASS – ALKALIGRASS		S3	BLUE
ELYMUS SPICATUS - BALSAMHORIZA SAGITTATA	BLUEBUNCH WHEATGRASS – BALSAMROOT		S2S3	BLUE
ELYMUS SPICATUS - KOELERIA MACRANTHA	BLUEBUNCH WHEATGRASS – JUNEGRASS		S2	RED
GLYCERIA BOREALIS FEN	NORTHERN MANNAGRASS FEN		S3	BLUE
JUNCUS BALTICUS - POTENTILLA ANSERINA	BALTIC RUSH – SILVERWEED		S2	RED
LEDUM GROENLANDICUM / SPHAGNUM SPP.	LABRADOR TEA / SPHAGNUM		S2S3	BLUE

MENYANTHES TRIFOLIATA - CAREX LASIOCARPA	BUCKBEAN - SLENDER SEDGE	S3	BLUE
PICEA ENGELMANII X GLAUCA / CALAMAGROSTIS RUBESCENS / HYLOCOMIUM	HYBRID WHITE SPRUCE / PINEGRASS / STEPMOSS	S3	BLUE
PICEA ENGELMANII X GLAUCA / EQUISETUM / MNIUM	HYBRID WHITE SPRUCE / HORSETAIL / LEAFY MOSS	S3	BLUE
PICEA ENGELMANII X GLAUCA / MATTEUCCIA STRUTHIOPTERIS	HYBRID WHITE SPRUCE / OSTRICH FERN	S2	RED
PICEA ENGELMANII X GLAUCA / OPLOPANAX / HYLOCOMIUM	HYBRID WHITE SPRUCE / DEVIL'S CLUB / STEP MOSS	S3	BLUE
PICEA ENGELMANII X GLAUCA / PLEUROZIUM - BRACHYTHECIUM	HYBRID WHITE SPRUCE / FEATHERMOSS - BRACHYTHECIUM	S3	BLUE
PICEA ENGELMANII X GLAUCA / RIBES LACUSTRE - VACCINIUM SCOPARIUM	HYBRID WHITE SPRUCE / GOOSEBERRY - GROUSEBERRY	S3	BLUE
PICEA ENGELMANII X GLAUCA / ROSA ACICULARIS / ARALIA NUDICAULIS	HYBRID WHITE SPRUCE / PRICKLY ROSE / SARSAPARILLA	S3	BLUE
PICEA ENGELMANII X GLAUCA / ROSA ACICULARIS / CAREX (RXC)	HYBRID WHITE SPRUCE / PRICKLY ROSE / SEDGE	S3	BLUE
PICEA ENGELMANII X GLAUCA / STEREOCAULON SPP.	HYBRID WHITE SPRUCE / CORAL LICHENS	S2	RED
PINUS CONTORTA / FESTUCA ALTAICA / STEREOCAULON	LODGEPOLE PINE / ALTAI FESCUE / STEREOCAULON	S3	BLUE
PINUS CONTORTA / LEDUM GLANDULOSUM / EMPETRUM NIGRUM	LODGEPOLE PINE / TRAPPER'S TEA / CROWBERRY	S2	RED
POPULUS TREMULOIDES / STIPA RICHARDSONII - GEUM TRIFLORUM	TREMBLING ASPEN / SPREADING NEEDLEGRASS - OLD MAN'S WHISKERS	S2	RED

PSEUDOTSUGA MENZIESII - PICEA ENGELMANII X GLAUCA / RUBUS PARVIFLORUS	HYBRID WHITE SPRUCE - DOUGLAS-FIR / THIMBLEBERRY	S3?	BLUE
PSEUDOTSUGA MENZIESII / ACER GLABRUM / HYLOCOMIUM	DOUGLAS-FIR / DOUGLAS MAPLE / STEP MOSS	S3	BLUE
PSEUDOTSUGA MENZIESII / ELYMUS SPICATUS - CALAMAGROSTIS RUBESCENS	DOUGLAS-FIR / BLUEBUNCH WHEATGRASS - PINEGRASS	S3	BLUE
PSEUDOTSUGA MENZIESII / ELYMUS SPICATUS - STIPA OCCIDENTALIS	DOUGLAS-FIR / BLUEBUNCH WHEATGRASS - NEEDLEGRASS	S3	BLUE
PSEUDOTSUGA MENZIESII / JUNIPERUS COMMUNIS / ARCTOSTAPHYLOS UVA-URSI	DOUGLAS-FIR / COMMON JUNIPER / KINNIKINNICK	S3	BLUE
PSEUDOTSUGA MENZIESII / JUNIPERUS COMMUNIS / CLADONIA	DOUGLAS-FIR / COMMON JUNIPER / CLADONIA	S2	RED
PSEUDOTSUGA MENZIESII / JUNIPERUS COMMUNIS / PENSTEMON	DOUGLAS-FIR / COMMON JUNIPER / PENSTEMON	S2S3	BLUE
PSEUDOTSUGA MENZIESII / JUNIPERUS SCOPULORUM - ARTEMISIA FRIGIDA	DOUGLAS-FIR / ROCKY MOUNTAIN JUNIPER - PASTURE SAGE	S3	BLUE
PSEUDOTSUGA MENZIESII / PLEUROZIUM - HYLOCOMIUM	DOUGLAS-FIR / FEATHERMOSS – STEPMOSS	S3	BLUE
PSEUDOTSUGA MENZIESII / ROSA WOODSII / ARALIA NUDICAULIS	DOUGLAS-FIR / PRICKLY ROSE / SARSAPARILLA	S2S3	BLUE
SALIX SSP. / CAREX SARTWELLI	TALL WILLOW / SARTWELL'S SEDGE	S3	BLUE
SCIRPUS LACUSTRIS MARSH	BULRUSH MARSH	S3	BLUE
SELAGINELLA Densa - ELYMUS SPICATUS / CLADONIA	SELAGINELLA - BLUEBUNCH WHEATGRASS / CLADONIA	S3	BLUE
SPOROBOLUS CRYPTANDRUS - STIPA COMATA	SAND DROPSEED - NEEDLE-AND-THREAD GRASS	S2	RED

STIPA RICHARDSONII	SPREADING NEEDLEGRASS	S2	RED
TRIGLOCHIN MARITIMUM MARSH	ARROWGRASS MARSH	S2S3	BLUE

41 PLANT ASSOCIATIONS LISTED

B.C. Conservation Data Centre: Rare Plant Association Tracking List
100 Mile House Forest District
April 26, 1999

This list is incomplete, especially with respect to wetland, alpine, and grassland plant associations. Please note that the ranks below reflect the rarity of plant association occurrences that have not been disturbed by humans or domestic animals, and are in a natural or "climax" state. Some plant associations are often confused with more common successional plant associations (e.g. *Pseudotsuga menziesii* / *Gaultheria shallon*), or they may occur commonly in degraded conditions (e.g. *Elymus spicatus* - *Koeleria macrantha*), but undisturbed occurrences are rare. Please consult our website or contact the CDC for more information on rare plant associations

SCIENTIFIC NAME	COMMON NAME	BEC UNIT*	PROV RANK	PROV LIST
ALNUS / ATHYRIUM	ALDER / LADY FERN		S2?	RED
ARTEMISIA CAMPTOSTRIS / STIPA CURTISETA PORCUPINE GRASS	PACIFIC SAGEBRUSH / SHORT-AWNED		S2	RED
ARTEMISIA TRIDENTATA / ELYMUS SPICATUS	BIG SAGE / BLUEBUNCH WHEATGRASS		S2	RED
BETULA GLANDULOSA - RIBES OXYACANTHOIDES	SCRUB BIRCH - NORTHERN GOOSEBERRY		S2	RED
BETULA GLANDULOSA / CAREX / SPHAGNUM	SCRUB BIRCH / SEDGE / SPHAGNUM		S2	RED
CAREX ATHERODES FEN – MARSH	AWNED SEDGE FEN - MARSH		S3	BLUE
CAREX LASIOCARPA / DREPANOCLADUS ADUNCUS	SLENDER SEDGE / DREPANOCLADUS MOSS		S3	BLUE
DISTICHLIS STRICTA – PUCCINELLIA NUTTALLIANA	SALTGRASS – ALKALIGRASS		S3	BLUE
ELYMUS SPICATUS - BALSAMHORIZA SAGITTATA	BLUEBUNCH WHEATGRASS - BALSAMROOT		S2S3	BLUE
ELYMUS SPICATUS - KOELERIA MACRANTHA	BLUEBUNCH WHEATGRASS – JUNEGRASS		S2	RED
JUNCUS BALTICUS - POTENTILLA ANSERINA	BALTIC RUSH – SILVERWEED		S2	RED
MENYANTHES TRIFOLIATA - CAREX LASIOCARPA	BUCKBEAN - SLENDER SEDGE		S3	BLUE

PICEA ENGELMANII X GLAUCA – BETULA OCCIDENTALIS / RIBES OXYACANTHOIDES	HYBRID WHITE SPRUCE - WATER BIRCH / NORTHERN GOOSEBERRY	S2	RED
PICEA ENGELMANII X GLAUCA / CALAMAGROSTIS RUBESCENS / HYLOCOMIUM	HYBRID WHITE SPRUCE / PINEGRASS / STEPMOSS	S3	BLUE
PICEA ENGELMANII X GLAUCA / EQUISETUM / MNIUM	HYBRID WHITE SPRUCE / HORSETAIL / LEAFY MOSS	S3	BLUE
PICEA ENGELMANII X GLAUCA / OPLOPANAX / HYLOCOMIUM	HYBRID WHITE SPRUCE / DEVIL'S CLUB / STEP MOSS	S3	BLUE
PICEA ENGELMANII X GLAUCA / RIBES LACUSTRE - VACCINIUM SCOPARIUM	HYBRID WHITE SPRUCE / GOOSEBERRY - GROUSEBERRY	S3	BLUE
PICEA ENGELMANII X GLAUCA / ROSA ACICULARIS / ARALIA NUDICAULIS	HYBRID WHITE SPRUCE / PRICKLY ROSE / SARSAPARILLA	S3	BLUE
PICEA ENGELMANII X GLAUCA / ROSA ACICULARIS / CAREX (RXC)	HYBRID WHITE SPRUCE / PRICKLY ROSE / SEDGE	S3	BLUE
PINUS CONTORTA / FESTUCA ALTAICA / STEREOCAULON	LODGEPOLE PINE / ALTAI FESCUE / STEREOCAULON	S3	BLUE
PINUS CONTORTA / LEDUM GLANDULOSUM / EMPETRUM NIGRUM	LODGEPOLE PINE / TRAPPER'S TEA / CROWBERRY	S2	RED
POPULUS TREMULOIDES / STIPA RICHARDSONII - GEUM TRIFLORUM	TREMBLING ASPEN / SPREADING NEEDLEGRASS - OLD MAN'S WHISKERS	S2	RED
PSEUDOTSUGA MENZIESII - PICEA ENGELMANII X GLAUCA / RUBUS PARVIFLORUS	HYBRID WHITE SPRUCE - DOUGLAS-FIR / THIMBLEBERRY	S3?	BLUE
PSEUDOTSUGA MENZIESII - PINUS PONDEROSA / ELYMUS SPICATUS	DOUGLAS-FIR - PONDEROSA PINE / BLUEBUNCH WHEATGRASS [BALSAMROOT]	S3	BLUE
PSEUDOTSUGA MENZIESII / ELYMUS SPICATUS - STIPA OCCIDENTALIS	DOUGLAS-FIR / BLUEBUNCH WHEATGRASS - NEEDLEGRASS	S3	BLUE

PSEUDOTSUGA MENZIESII / JUNIPERUS COMMUNIS / ARCTOSTAPHYLOS UVA-URSI	DOUGLAS-FIR / COMMON JUNIPER / KINNIKINNICK	S3	BLUE
PSEUDOTSUGA MENZIESII / JUNIPERUS COMMUNIS / CLADONIA	DOUGLAS-FIR / COMMON JUNIPER / CLADONIA	S2	RED
PSEUDOTSUGA MENZIESII / JUNIPERUS COMMUNIS / PENSTEMON	DOUGLAS-FIR / COMMON JUNIPER / PENSTEMON	S2S3	BLUE
PSEUDOTSUGA MENZIESII / JUNIPERUS SCOPULORUM - ARTEMISIA FRIGIDA	DOUGLAS-FIR / ROCKY MOUNTAIN JUNIPER - PASTURE SAGE	S3	BLUE
PSEUDOTSUGA MENZIESII / JUNIPERUS SCOPULORUM / ELYMUS SPICATUS	DOUGLAS-FIR / ROCKY MOUNTAIN JUNIPER / BLUEBUNCH WHEATGRASS	S2	RED
PSEUDOTSUGA MENZIESII / PLEUROZIUM - HYLOCOMIUM	DOUGLAS-FIR / FEATHERMOSS – STEPMOSS	S3	BLUE
PSEUDOTSUGA MENZIESII / ROSA WOODSII / ARALIA NUDICAULIS	DOUGLAS-FIR / PRICKLY ROSE / SARSAPARILLA	S2S3	BLUE
PSEUDOTSUGA MENZIESII / SYMPHORICARPOS OCCIDENTALIS / ELYMUS SPICATUS	DOUGLAS-FIR / WESTERN SNOWBERRY / BLUEBUNCH WHEATGRASS	S3	BLUE
SALIX SSP. / CAREX SARTWELLI	TALL WILLOW / SARTWELL'S SEDGE	S3	BLUE
SCIRPUS LACUSTRIS MARSH	BULRUSH MARSH	S3	BLUE
SPOROBOLUS CRYPTANDRUS - STIPA COMATA	SAND DROPSEED - NEEDLE-AND-THREAD GRASS	S2	RED
STIPA RICHARDSONII	SPREADING NEEDLEGRASS	S2	RED
THUJA PLICATA / GYMNOCARPIUM DRYOPTERIS / RHYTIDIADELPHUS	WESTERN REDCEDAR / OAK FERN / CAT'S-TAIL MOSS	S3	BLUE
THUJA PLICATA / OPLOPANAX HORRIDUS / EQUISETUM ARVENSE	WESTERN REDCEDAR / DEVIL'S CLUB / HORSETAIL	S3	BLUE

THUJA PLICATA / PAXISTIMA MYRSINITES - VACCINIUM	WESTERN REDCEDAR / FALSEBOX - HUCKLEBERRY	S3	BLUE
THUJA PLICATA / RUBUS IDAEUS / GYMNOCARPIUM	WESTERN REDCEDAR / RASPBERRY / OAK FERN	S3	BLUE
TRIGLOCHIN MARITIMUM MARSH	ARROWGRASS MARSH	S2S3	BLUE
TSUGA HETEROPHYLLA - THUJA PLICATA / CLADONIA	WESTERN HEMLOCK - WESTERN REDCEDAR / CLADONIA	S3	BLUE
TSUGA HETEROPHYLLA / JUNIPERUS - PAXISTIMA	WESTERN REDCEDAR / JUNIPER – FALSEBOX	S3	BLUE

44 PLANT ASSOCIATIONS LISTED

BEC Unit: Biogeoclimatic Ecosystem Classification unit in which each plant association can occur. These units are described in the Ministry of Forests' "Field Guide to Site Identification and Interpretation" for the appropriate Forest Region. Please note that the BEC units listed are for the entire Forest Region, and may not all occur in this Forest District. Units numbered "00" have not yet been assigned site series numbers by the Ministry of Forests.



Appendix 4
CORRIDOR: DATA COLLECTION

1. May 1997
2. July 1997
3. Sept. 1997
4. Oct. 1998

May 29, 1997, RECONNAISSANCE TRIP – SEI MAPPING - TRANSMISSION CORRIDOR

Weather Conditions: very cloudy, intermittent rain, moderate visibility

Distance flown: 117 km (73 miles) from camp to power intersection east of the Fraser River.

POINT REF. #	LOCATION	LAT (N) LONG (W)	PHOTO #	VEGETATION
F1	Tete Angela Creek NTS 1:50,000 92 O/11	51°31'50" N 123°28'50" W	Roll # Print # 26, 27	Meadows at break of slope below Vedan Mtn. - appear to be fairly dry meadows near creek. Elevation along creek is approx. 5300ft. Wetlands here in MS different to SBPS. Scattered PI. There are some warm aspect scattered dry meadows just above this area, but very small in extent.
Between F1/F2	en route to Kloatut Creek			Extensive MS stands in young seral condition, recent clearcuts.
F2	Kloatut Lake NTS 1:50,000 92 O/11	51°35'30" N 123°24'00" W	Roll # Print #28 - aerial view, #29 - spruce/ willow/sedge complex, #30 - looking across meadow towards lake	Patch of spruce-dominated wet forests and wet meadows adjacent to south edge of lake. Spruce/willow/coarse sedge wetland complex. Lots of standing water (about 10% cover at time of visit). Hummocky, mossy mounds with scrub birch, sedges, lots of moss species including some <i>Sphagnum</i> .
F3	NTS 1:50,000 92 O/11	51°37'02" N 123°21'08" W		Small linear wetland with scattered trees. Back into dry pine. Large clearcut on left.
Between F3/F4	Next Section			Fairly extensive area of rather poor, straggly looking open PI stands with a number of clearcuts.
F4	Willan Creek NTS 1:50,000 92 O/11	51°37'55" N 123°19'30" W		Extensive wet spruce, similar wetland to F3, adjacent section of young hemlock/spruce forest with some open grass areas? Up slope good spruce and into Pi/Si/Aspen.
F5	Willan Lake NTS 1:50,000 92 O/11	51°40'28" N 123°14'16" W		Bluff near top of unnamed hill. Hill has small, scattered aspen patches among young PI stands, nothing unusual. Small, dry bluff near top - higher elevation than earlier bluffs (in mine site study area?) - probably worth a look. Road crosses line here. Small lake - clearcut all around, pine clearcut, pine, following road. Willan Creek - narrow. Clearcut to left of creek. Area needs further field work.

POINT REF. #	LOCATION	LAT (N) LONG (W)	PHOTO #	VEGETATION
Between F5/F6	Heading to Willan Lake - across road	51°39'34" N 123°15'57" W		
F6	Stopped at Bambrick Creek NTS 1:50,000 92 O/11	51°40'17" N 123°10'47" W	Roll # Print #33 - of river and adjacent dry slopes Print #34 - adjacent meadow on south side of creek.	Wetland, adjacent to small lake, then into clearcuts en route to Willan Lake - takes a corner in the line over a clear cut. Line then runs parallel to Bamber Creek to our right. Small creek connects to Willan Ck. At stop - on south side - tall PI stand - good growing site, structural stage 5. Lots of <i>Pyrola</i> sp. and grasses below. Dry slopes on north side of creek - appear quite different to dry slopes within the mine area. Lots of grasses, <i>Arctostaphylos uva-ursi</i> , and more juniper. Lots more <i>Artemisia frigida</i> and <i>Amelanchier</i> . <i>Smilacena stellata</i> (?) abundant, and lots of <i>Spirea (betulifolia?)</i> .
Between F6/F7	Continuing along Bambrick Creek		Roll # Print #34, 35 (from air) - tall willow scrub wetlands before Big Creek	Extensive young PI stands on gentle slopes, then huge clearcuts. Coming up to Big creek, crosses road, with mixed forest stands below, and some tall willow scrub wetlands
F7	Wetlands area around Big Creek NTS 1:50,000 92 O/11	51°40'03" N 123°04'30" W		
Between F7/F8	Continuing on past small ponds etc. then heading towards Mons Lake			Agricultural/forest area, area of several small ponds and wetlands - Towards lake - appear to be getting into the IDF, starting to see increasing amounts of Fd.
BAEA	NTS 1:50,000 92 O/11	51°42'32" N 123°01'30" W		
	continuing on			Open Fd/PI forests with aspen - structural stage 4, plus some older clearcuts (possibly seed tree retention?).

POINT REF. #	LOCATION	LAT (N) LONG (W)	PHOTO #	VEGETATION
F8	South of Big Crk., East of Mons Creek NTS 1:50,000 92 O/10	51°42'30" N 123°57'00" W	Roll #C Print #1 - pond/wetland complex	Meadows around wetlands.
Between F8/F9				Extensive young PI/Fd stands present.
F9	South of Big Crk., East of Mons Creek NTS 1:50,000 92 O/10	51°42'55" N 123°55'25" W	Roll #C Print #2	Creek with dry, west facing grassy slopes above
Between F9/F10				Burned stands, clearcuts, and plantations present.
F10	Before Vedan Creek NTS 1:50,000 92 O/10	51°43'21" N 122°48'14" W	Roll #C Print #3 Print #4 - adjacent cleared areas planted to Fd	Old, mixed stand.
F11	Before Vedan Creek NTS 1:50,000 92 O/10	51°43'21" N 122°47'06" W	Roll #C Prints # 5, 6, 7, 8	Now in IDF. Alkaline wetlands and surrounding dry forests. Adjacent on east side - Fd mesic forest, with Fd, PI, understorey of aspen, <i>Shepherdia</i> - very patchy in age stage 5 some patches 4. Forests on west side look better. Further to south, more wetlands, shrub areas - very diverse area with multiple wetlands of several kinds.
F12	Vedan Creek NTS 1:50,000 92 O/10	51°43'43" N 122°44'09" W	Roll #C Print #10	Line crosses wetland then into clearcut area.
Between F12/F13	Northwest of Farwell Creek NTS 1:50,000 92 O/10			More young Fd forests and clearcuts - some areas of older Fd6/7, then young PI 5 stands up the slopes. After PI - climbs in elevation - hilly, more undulating country here. Logging with seed trees left, some old-growth stands mixed with patches of young Fd, PI.

POINT REF. #	LOCATION	LAT (N) LONG (W)	PHOTO #	VEGETATION
F13	NTS 1:50,000 92 O/10	51°41'33" N 122°31'45" W	Roll #C Print #11 - shows long, dry, s-facing slopes north of the road	Old-growth Fd on a north-facing slope is un-logged - up near hill top. On north side of road are dry south aspect slopes.
Between F13/F14				Lots of younger open stands with grasses below on gentle, warm slopes. Selectively logged in past? Scattered small open meadows.
Between F13/F14	Descending into open grasslands NTS 1:50,000 92 O/9		No pictures - very rainy	May now be in the BG zone? Lots of cattle here. Patches of aspen, fir.
Between F13/F14	Drop into Fraser canyon NTS 1:50,000 92 O/9		Roll #C Prints #12, 13 Print (Jan's) #1 - looking west across Fraser, #2 - view of bench and route up side, #3 - general view to south, #4 - looking east - bench below will accomm. pylon for span, #5 - heading east just above first bench then -	Grassland/sagebrush country towards Dog Creek - open slopes continue up into forest. Lots of <i>Balsamorhiza</i> in flower visible in openings. Open grassland at top. Route mainly through forests not grasslands. Some small grassy openings within forests. Need to check on CDC listed forest types for this area (check old-growth).

POINT REF. #	LOCATION	LAT (N) LONG (W)	PHOTO #	VEGETATION
			cross river and up to Dog Creek	
F14	Small wetland east of Newman Creek NTS 1:50,000 92 O/9	51°40'48" N 122°10'17" W		Small wetland present.
F15		51°40'37" N 122°09'56" W	Prints (Jan's) #6, 7	Small lake and wetland.
Between F15/F16	Brigham Lake area			Clearcut on west side, more Fd/grassland mix to east.
F16	Near Rosetti Creek, East of Brigham NTS 1:50,000 92 O/9	51°39'37" N 122°02'09" W	Print (Jan's) #8	Series of meadows and wetlands.
F17	NTS 1:50,000 92 O/9	51°40'17" N 122°01'17" W	Print (Jan's) #9	Creek, wetlands, and meadows.

July 1997 Reconnaissance - SEI Mapping - Transmission Corridor

Date	Plot Number	Original Poly #	Location Description	S.E.I. Form	Air Photo 30BC C#	BEC	% slope	Aspect	SMR	SNR	Elev.	Meso slope	Drainage	Forested Site Assoc.	Non-Forested Ecosystems	Soil	Dist. History (natural)	Dist. History (anthropogenic)	Adj. Land Uses
97-07-29	F1	157	Tete Angela Creek	uplands	93099-056		0	999	5	D	1650		w	n/a	grass meadow	Rhizomull	animal use	grazing; recreation (campfire/trails)	natural forest
97-07-29	F8	967	landing between 2 ponds	wetlands							1175							cattle grazing	
97-07-29	F1a	157	Tete Angela Creek	uplands	93099-056										shrub carr (willow-birch)		animal use		
97-07-29	F11.1b	575	dry hill above lake	uplands															
97-07-29	F11.1	584	Jamieson meadows	wetlands	93028-188						1135					mineral	animal use	beaver dams	agriculture, road to north
97-07-29	F11.2	630	shrub wetland	wetlands	93028-188						1140						animal use	grazing; recreation	grazing, forestry wetlands
97-07-29	F11.2b	624	mesic forests with scattered Fd vets	uplands	93028-188		16	60	4	C	1140	mid		1			animal use	grazing (cattle)	
97-07-29	F11.2a	627	dry slope as 11.1	uplands															
97-07-29	FR1	827	Fraser Canyon - bench on west side	uplands	95077-203	BGxh3	11	115	3	B	570	mid	w	no	bunchgrass - sagebrush community		animal use (sheep or deer?)		
97-07-29	FR2	830	East side of Fraser Canyon on first bench	uplands	95077-201		0	999			580	toe			benchgrass - sagebrush (is this seeded grass?)	much more mineral soil than FR1		grazing	

September 1997 Reconnaissance SEI Mapping - Transmission Corridor

Date M/D/YR	Original Polygon #	Current Polygon #	Location Description	F(field) V(visual)	S.E.I. Form	Air Photo 30BC C#	Map sheet (1:50,000)	Photo Roll/ Print#	BEC	% slope	Aspect	Moist. Regime	Nutrient Regime	Elev.	Meso slope	Drain age	Forested Site Assoc.	Non- Forested Eco systems	Soil	Dist. History (natural)	Dist. History (anthro pogenic)	Adj. land uses	Known threats	Eco. Typed
Sep-8-97	9a	89	West of Tete Angela Crk.	F (field)	Wetland	93099 #172	92-O/5	Roll 1 #21						1670					Organic - water table is at the surface	Flooding		Wn and Pine forests		Wn and Ow
Sep-8-97	6d	93	West of Tete Angela Crk.	F (field)	Wetland	93099 #172	92-O/5	Roll 1 #12, 13, 14						1675					Mineral - Sil, rounded coarse fragments, Lfn 10cm	Flooding, Animal use	Grazing	Forest	TC	Wn
Sep-8-97	6a	93	West of Tete Angela Crk.	F (field)	Wetland	93099 #172	92-O/5	Roll 1 #16 & 12						1675					Organic - Fibrisol, Van Post 1 (clear), water table a 10cm, bouncy surface (wet feet!)	Flooding	Animal use			Wn
Sep-8-97	6b	93	West of Tete Angela Crk.	F (field)	Wetland	93099 #172	92-O/5	Roll 1 #17						1675					Organic - Fibrisol, Von Post 4 at surface, brown and 5 at 30cm squishier	Flooding, Animal use	Grazing			Og (Pl Sx)
Sep-8-97	*14c	157	Tete Angela Creek (*poygon repeated on 93099#057 - both are typed Wn)	F (field)	Uplands	93099 #056	92-O/11	Roll 2 #7, 10, 11		0	0	2		1605	LV			Very dry meadow, lichens	Mineral - probably fluvio-glacial (old) high coarse frags.			Forest, Creek,	Horse trail from ranch?	Wn
Sep-8-97	27	187		F (field)	Uplands	93098 #169	92-O/11	Roll 2#16, 17, 18			warm	1 to 2	A-B	6300	CR-UP	r	MSxv 03?		rocky					
Sep-8-97	41	220	West of Kloatut Lake	F (field)	Uplands	93098 #049	92-O/11	Roll 2#23, 24, Roll 3 #1						1605	MD	M-	MSxv SS 6/7					Mesic PISw stands		Ri
Sep-8-97	42	224	West of Kloatut Lake	F (field)	Uplands	93098 #049	92-O/11	Roll 2 #20, 21, 22		5	340	5	C	1615	MD	i	MSxv 05?					Gravel road for logging adjacent	Logging	Ri
Sep-8-97	57=59	246	Kloatut Lake	F (field)	Wetland	93049 #105	92-O/11	Roll 3 #5						1540					Mineral - hummocky, wet humisol	Flooding	Grazing			Wn

Date	Original Polygon	Current Polygon	Location Description	F(field)	S.E.I.	Air Photo	Map sheet	Photo	BEC	% slope	Aspect	Moist.	Nutrient	Elev.	Meso slope	Drain age	Forested	Non-Forested	Soil	Dist. History	Dist. History	Adj. land uses	Known threats	Eco.	
M/D/YR	#	#		V(visual)	Form	30BC C#	(1:50,000)	Roll/ Print#				Regime	Regime				Site Assoc.	Eco systems		(natural)	(anthropogenic)			Typed	
																			on mineral						
Sep-8-97	6c	93	West of Tete Angela Crk.	F(field)	Uplands	93099 #172	92-O/5	Roll 1 #18, 19, 20		2	Na	3	C	1675			MS 01		Mineral soil 10%	Windthrow, Disease		Wetland, Forest		Wn	
Sep-8-97	13a	117	Just West of Tete Angela Crk.	F(field)	Wetland	93099 #173	92-O/11	Roll2- 1 to 5						1650					Mineral - Sil with 10% cobbles on surface (rounded cobbles)	Flooding,	Animal Use	Adj. Pine stands SS 5-6		Wn	
Sep-8-97	13b	117	Just West of Tete Angela Crk.	F(field)		93099 #173	92-O/11	Roll2- 1 to 5																	
Sep-8-97	58	245	Kloatut Lake	F(field)	Wetland	93049 #105	92-O/11							1540					Organic v. rich humus to 30cm	Flooding		Forest, lake		Wn	
Sep-8-97	60	249	Kloatut Lake	F(field)	Wetland	93049 #105	92-O/11	Roll 3 #4				5	C						Mineral - expect high water table in the winter	Flooding v. ?	Grazing?	wetlands/ lake/ forest			
Sep-8-97	2	71	West of Tete Angela Crk.	V		93099 #172	92-O/5																		
Sep-8-97	3	71	West of Tete Angela Crk.	V		93099 #172	92-O/5																		
Sep-8-97	10	98	West of Tete Angela Crk.	V		93099 #172	92-O/5																		
Sep-8-97	11	99	West of Tete Angela Crk.	V		93099 #172	92-O/5																		
Sep-8-97	8	105	West of Tete Angela Crk.	V		93099 #172	92-O/5																		
Sep-8-97	15	153	Tete Angela Creek	V		93099 #056	92-O/11	Roll 2 #12, 13, 14																Ht	
Sep-8-97	17	167	Tete Angela Creek	V		93099 #056	92-O/11	Roll 2 #9																Ri	
Sep-8-97	19	168	Tete Angela Creek	V		93099 #056	92-O/11	Roll 2 #6																Wn	
Sep-8-97	18	169	Tete Angela Creek	V		93099 #056	92-O/11	Roll 1 #25																Ri	
Sep-8-97	*21	172	*Polygon on two photos	V		93099 #056	92-O/11	Roll 2#8																	
Sep-8-97	25	197		V		93098 #169	92-O/11	Roll 2#15																	
Sep-8-97	31	198		V		93098 #169	92-O/11																		
Sep-8-97	35	200		V		93098 #169	92-O/11																	Ht	
Sep-8-97	36	204		V		93098 #169	92-O/11																	Ht	
Sep-8-97	38	208		V		93098 #051	92-O/11																	Og	

Date M/D/YR	Original Polygon #	Current Polygon #	Location Description	F(field) V(visual)	S.E.I. Form	Air Photo 30BC C#	Map sheet (1:50,000)	Photo Roll/ Print#	BEC	% slope	Aspect	Moist. Regime	Nutrient Regime	Elev.	Meso slope	Drain age	Forested Site Assoc.	Non- Forested Eco systems	Soil	Dist. History (natural)	Dist. History (anthro pogenic)	Adj. land uses	Known threats	Eco. Typed	
Sep-8-97	43	221	West of Kloatut Lake	V		93098 #049	92-O/11																	Ht	
Sep-8-97	37	229		V		93098 #051	92-O/11																		
Sep-8-97	46	234	West of Kloatut Lake	V		93098 #049	92-O/11																		Wn
Sep-8-97	45	236	West of Kloatut Lake	V		93098 #049	92-O/11	Roll 3 #2, 3																	Ri/Og
Sep-8-97	44	238	West of Kloatut Lake	V		93098 #049	92-O/11																		Ht
Sep-8-97	48	239	West of Kloatut Lake	V		93098 #049	92-O/11																		Wn
Sep-8-97	51	240	Kloatut Lake	V		93049 #105	92-O/11																		Og
Sep-8-97	52	243	Kloatut Lake	V		93049 #105	92-O/11																		Wn
Sep-8-97	53	244	Kloatut Lake	V		93049 #105	92-O/11																		Wn
Sep-8-97	61	250	Kloatut Lake	V		93049 #105	92-O/11																		Og
Sep-8-97	62	251	Kloatut Lake	V		93049 #105	92-O/11																		Og
Sep-8-97	54	252	Kloatut Lake	V		93049 #105	92-O/11	Roll 3 #6																	Wn
Sep-8-97	63	253	Kloatut Lake	V		93049 #105	92-O/11																		Og
Sep-8-97	4	1040	West of Tete Angela Crk.	V		93099 #172	92-O/5	Roll 1 #24																	
Sep-8-97	5	1042	West of Tete Angela Crk.	V		93099 #172	92-O/5	Roll 1 #23																	
Sept-10-97	91	292	East of Koatut Lake (91a)	F (field)		93031 #147	92-O/11	Roll 5 #19, 20	SBP Sxc																Wn
Sept-10-97	91	292	East of Koatut Lake (91b)	F (field)		93031 #147	92-O/11		SBP Sxc																Wn
Sept-10-97	91	292	East of Koatut Lake (91c)	F (field)		93031 #147	92-O/11	Roll 5 #21	SBP Sxc																Wn
Sept-10-97	163	390	Bambrick Creek	F (field)		93031 #063	92-O/11	Roll 5 #24	SBP Sxc																Ri
Sept-10-97	194	451	Big Creek Crossing	F (field)		93030-076	92-O/11	Roll 6 #2	SBP S																Wn
Sept-10-97	200	453	Big Creek Crossing (200a)	F (field)		93030-076	92-O/11	Roll 6 #s 3 - 7	SBP Sxc																
Sept-10-97	200	453	Big Creek Crossing (200b)	F (field)		93030-076	92-O/11	Roll 6 #s 9, 10	SBP Sxc																
Sept-10-97	200	453	Big Creek Crossing (200c)	F (field)		93030-076	92-O/11		SBP Sxc																
Sept-10-97	201	454	Big Creek Crossing	F (field)		93030-076	92-O/11	Roll 6 #1	SBP Sxc?																Wn
Sept-10-97	487	155	East of Big Creek Area	V		93028 #183																			

Date M/D/YR	Original Polygon #	Current Polygon #	Location Description	F(field) V(visual)	S.E.I. Form	Air Photo 30BC C#	Map sheet (1:50,000)	Photo Roll/ Print#	BEC	% slope	Aspect	Moist. Regime	Nutrient Regime	Elev.	Meso slope	Drain age	Forested Site Assoc.	Non- Forested Eco systems	Soil	Dist. History (natural)	Dist. History (anthro pogenic)	Adj. land uses	Known threats	Eco. Typed
Sept-10-97	72	255		V		93049 #107	92-O/11																	Ht
Sept-10-97	71	256		V		93049 #107	92-O/11	Roll 5 #17																Ht
Sept-10-97	73	257		V		93049 #107	92-O/11																	Ht
Sept-10-97	70	258		V		93049 #107	92-O/11																	Ht
Sept-10-97	67	260		V		93049 #107	92-O/11																	Og
Sept-10-97	65	262		V		93049 #107	92-O/11																	
Sept-10-97	66	263		V		93049 #107	92-O/11																	
Sept-10-97	68	265		V		93049 #107	92-O/11																	Og
Sept-10-97	74	271		V		93049 #107	92-O/11																	
Sept-10-97	77	272		V		93049 #048	92-O/11																	Wn
Sept-10-97	79	274		V		93049 #048	92-O/11	Roll 5 #18																Ri
Sept-10-97	82	275		V		93049 #048	92-O/11																	Og
Sept-10-97	83	276		V		93049 #048	92-O/11																	Og
Sept-10-97	80	281		V		93049 #048	92-O/11																	Ri
Sept-10-97	93	283		V		93031 #147	92-O/11																	Og
Sept-10-97	90	286		V		93049 #048	92-O/11																	Wn
Sept-10-97	88	287		V		93049 #048	92-O/11																	Wn
Sept-10-97	94	299		V		93031 #147	92-O/11																	Og
Sept-10-97	95	304		V		93031 #147	92-O/11																	Og
Sept-10-97	96	305		V		93031 #145	92-O/11																	Ht
Sept-10-97	97	306		V		93031 #145	92-O/11																	Ht
Sept-10-97	98	307		V		93031 #145	92-O/11																	Ht
Sept-10-97	99	308		V		93031 #145	92-O/11																	Og
Sept-10-97	100	309		V		93031 #145	92-O/11																	Ht
Sept-10-97	101	310		V		93031 #145	92-O/11																	Og
Sept-10-97	103	311		V		93031 #145	92-O/11																	Ht
Sept-10-97	104	312		V		93031 #145	92-O/11																	Ht
Sept-10-97	105	313		V		93031 #145	92-O/11																	Ri

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M/D/YR	#	#		V(visual)	Form	30BC C#	(1:50,000)	Roll/ Print#				Regime	Regime				Site Assoc.	Eco systems		(natural)	(anthropogenic)				
Sept-10-97	106	314		V		93031 #145	92-O/11																	Og	
Sept-10-97	107	315		V		93031 #145	92-O/11																		Og
Sept-10-97	112	335	Willan Lake Area	V		93031 #059	92-O/11																		Og
Sept-10-97	115	336	Willan Lake Area	V		93031 #059	92-O/11																		Ht
Sept-10-97	116	337	Willan Lake Area	V		93031 #059	92-O/11																		Wn
Sept-10-97	108	340		V		93031 #145	92-O/11																		Wn
Sept-10-97	118	344	Willan Lake Area	V		93031 #061	92-O/11																		
Sept-10-97	122	345	Willan Lake Area	V		93031 #061	92-O/11																		Wn
Sept-10-97	111	346		V		93031 #145	92-O/11																		Wn
Sept-10-97	119	347	Willan Lake Area	V		93031 #061	92-O/11																		Wn
Sept-10-97	126	350	Willan Lake Area	V		93031 #061	92-O/11																		Wn
Sept-10-97	120	351	Willan Lake Area	V		93031 #061	92-O/11																		Wn
Sept-10-97	135	353	Willan Lake Area	V		93031 #061	92-O/11																		
Sept-10-97	136	355	Willan Lake Area	V		93031 #061	92-O/11																		Og
Sept-10-97	129	358	Willan Lake Area	V		93031 #061	92-O/11																		Wn
Sept-10-97	131	360	Willan Lake Area	V		93031 #061	92-O/11																		wn
Sept-10-97	154	363	Bambrick Creek Area	V		93031 #063	92-O/11	Roll 5 #23																	Og
Sept-10-97	151	364	Willan Lake Area	V		93031 #061	92-O/11																		
Sept-10-97	150	365	Willan Lake Area	V		93031 #061	92-O/11																		
Sept-10-97	148	366	Willan Lake Area	V		93031 #061	92-O/11																		Ht
Sept-10-97	147	367	Willan Lake Area	V		93031 #061	92-O/11																		Ht
Sept-10-97	145	368	Willan Lake Area (2 photos with this poly# 93031#s061&063)	V		93031 #061	92-O/11																		
Sept-10-97	143	369	Willan Lake Area	V		93031 #061	92-O/11																		Wn
Sept-10-97	142	370	Willan Lake Area	V		93031 #061	92-O/11																		Wn
Sept-10-97	144	371	Willan Lake Area	V		93031 #061	92-O/11																		Wn
Sept-10-97	139	372	Willan Lake Area	V		93031 #061	92-O/11																		

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Sept-10-97	125	373	Willan Lake Area	V		93031 #061	92-O/11																	Ht
Sept-10-97	155	376	Bambrick Creek Area	V		93031 #063	92-O/11																	Ht
Sept-10-97	156	378	Bambrick Creek Area	V		93031 #063	92-O/11																	Ht
Sept-10-97	152	381		V		93031 #063	92-O/11																	Ht
Sept-10-97	158	384	Bambrick Creek Area	V		93031 #063	92-O/11																	Ht
Sept-10-97	160	385	Bambrick Creek Area	V		93031 #063	92-O/11																	Ht
Sept-10-97	161	387	Bambrick Creek Area	V		93031 #063	92-O/11																	
Sept-10-97	162	389	Bambrick Creek Area	V		93031 #063	92-O/11																	Ri
Sept-10-97	164	391		V		93031 #063	92-O/11																	Ht
Sept-10-97	485	393		V		93028 #181																		Sg
Sept-10-97	165	397		V		93031 #065	92-O/11																	Wn
Sept-10-97	467	398	Poly # used twice (95079#139 - Wn)	V		93031 #065																		Og
Sept-10-97	166	399		V		93031 #065	92-O/11																	Ht
Sept-10-97	167	400		V		93031 #065	92-O/11																	Wn
Sept-10-97	169	401		V		93031 #065	92-O/11																	Ri
Sept-10-97	170	402		V		93031 #065	92-O/11																	Ht
Sept-10-97	172	404		V		93031 #065	92-O/11																	Ht
Sept-10-97	472	412	Poly # used twice	V		93031 #067																		
Sept-10-97	173	413		V		93031 #067	92-O/11																	Wn
Sept-10-97	174	413		V		93031 #067	92-O/11																	Wn
Sept-10-97	175	414		V		93031 #067	92-O/11																	Ri
Sept-10-97	189	415		V		93030 # 078, 068 & 076	92-O/11																	Ri
Sept-10-97	185	441		V		93030 #078	92-O/11																	Wn
Sept-10-97	186	442		V		93030 #078	92-O/11																	Wn
Sept-10-97	197	452	Big Creek Crossing	V		93030-076	92-O/11	Roll 6 #8																Ht
Sept-10-97	204	462	Big Creek Area	V		93030-076	92-O/11																	Wn

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Sept-10-97	211	472	2 polygons with this #	V		93028 #033	92-O/11																	Ht	
Sept-10-97	212	473	2 polygons with this #	V																					
Sept-10-97	212	473		V		93028 #033	92-O/11																	Wn	
Sept-10-97	213	475		V		93028 #033	92-O/11																	Ht	
Sept-10-97	216	476		V		93028 #033	92-O/11																		
Sept-10-97	214	477		V		93028 #033	92-O/11																	Wn	
Sept-10-97	215	478		V		93028 #033	92-O/11																		
Sept-10-97	217	479		V		93028 #033	92-O/11																	Og	
Sept-10-97	225	479	Mons Lake Area	V		93028 #031	92-O/10																	Og	
Sept-10-97	227	479		V		93028 #031	92-O/10																	Ht	
Sept-10-97	218	480		V		93028 #033	92-O/11																	Wn	
Sept-10-97	221	481		V		93028 #033	92-O/11																	Wn	
Sept-10-97	222	482	Mons Lake	V		93028 # 033 & 031	92-O/11&10																		
Sept-10-97	223	482	Mons Lake	V		93028 #031	92-O/10																		
Sept-10-97	224	486	Mons Lake	V		93028 #031	92-O/10																		
Sept-10-97	226	488		V		93028 #031	92-O/10																	Wn	
Sept-10-97	248	499	Big Creek Area	V		93028 #181	92-O/10																	Ri	
Sept-10-97	253	500	Big Creek Area	V		93028 #181	92-O/10																	Wn	
Sept-10-97	260	509		V		93028 #183	92-O/10																	Ri	
Sept-10-97	241	528	Big Creek Area	V		93028 #181	92-O/10																	Ht	
Sept-10-97	244	529	Big Creek Area	V		93028 #181	92-O/10																		
Sept-10-97	245	530	Big Creek Area	V		93028 #181	92-O/10																	Wn	
Sept-10-97	246	531	Big Creek Area	V		93028 #181	92-O/10																	Wn	
Sept-10-97	249	534	Big Creek Area	V		93028 #181	92-O/10																		
Sept-10-97	254	544		V		93028 #183	92-O/10																		
Sept-10-97	257	547		V		93028 #183	92-O/10																		
Sept-10-97	258	548		V		93028 #183	92-O/10																		
Sept-10-97	259	549		V		93028	92-O/10																		

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M/D/YR	#	#		V(visual)	Form	30BC C#	(1:50,000)	Roll/ Print#				Regime	Regime				Site Assoc.	Eco systems		(natural)	(anthropogenic)				
10-97						#183																			
Sept-10-97	261	550		V		93028 #183	92-O/10																	Og	
Sept-10-97	484	552	Poly # used twice	V		93028 #181																			Sg
Sept-10-97	264	564		V		93028 #185	92-O/10																		Wn
Sept-10-97	265	565		V		93028 #185	92-O/10																		Wn
Sept-10-97	266	566		V		93028 #185	92-O/10																		Wn
Sept-10-97	267	567		V		93028 #185	92-O/10																		Wn
Sept-10-97	271	572		V		93028 #185	92-O/10																		Wn
Sept-10-97	269	573		V		93028 #185	92-O/10																		Wn
Sept-10-97	273	574		V		93028 #185	92-O/10																		Wn
Sept-10-97	275	575		V		93028 #187	92-O/10																		
Sept-10-97	276	580		V		93028 #187	92-O/10																		Wn
Sept-10-97	414	868		V		95077 #199	92-O/9																		Ht
Sept-10-97	413	869		V		95077 #199	92-O/9																		Ht
Sept-10-97	407	872		V		95077 #199	92-O/9																		Ht
Sept-10-97	410	874		V		95077 #199	92-O/9																		Ri
Sept-10-97	408	875		V		95077 #199	92-O/9																		Sv
Sept-10-97	409	876		V		95077 #199	92-O/9																		Ht
Sept-10-97	421	877		V		95077 #197	92-O/9																		Ht
Sept-10-97	422	878		V		95077 #197	92-O/9																		Wn
Sept-10-97	416	883		V		95077 #199	92-O/9																		Ht
Sept-10-97	418	885		V		95077 #197	92-O/9																		Ht
Sept-10-97	419	887		V		95077 #197	92-O/9																		Ht
Sept-10-97	420	888		V		95077 #197	92-O/9																		Ht
Sept-10-97	427	891		V		95077 #195	92-O/9																		Wn
Sept-10-97	425	893		V		95077 #195	92-O/9																		Ht
Sept-10-97	424	894		V		95077 #195	92-O/9																		Ht
Sept-10-97	426	895		V		95077 #195	92-O/9																		Wn
Sept-10-97	429	911		V		95077	92-O/9																		Wn

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M/D/YR	#	#		V(visual)	Form	30BC C#	(1:50,000)	Roll/ Print#				Regime	Regime				Site Assoc.	Eco systems		(natural)	(anthropogenic)				
10-97						#193																			
Sept-10-97	430	913		V		95077 #193	92-O/9																	Wn	
Sept-10-97	431	914		V		95077 #193	92-O/9																	Wn	
Sept-10-97	432	915		V		95077 #193	92-O/9																	Wn	
Sept-10-97	443	953		V		95079 #131	92-O/9																	Wn	
Sept-10-97	440	955		V		95079 #131	92-O/9																	Wn	
Sept-10-97	441	956		V		95079 #131	92-O/9																	Wn	
Sept-10-97	449	958		V		95079 #133	92-O/9																	Wn	
Sept-10-97	447	959		V		95079 #133	92-O/9																	Wn	
Sept-10-97	446	960		V		95079 #133	92-O/9																	Ht	
Sept-10-97	448	960		V		95079 #133	92-O/9																	Ht	
Sept-10-97	203	?	Big Creek Area	V		93030-076	92-O/11																		
Sept-10-97	205	?	Big Creek Area	V		93030-076	92-O/11																		
Sept-10-97	209	?	Big Creek Area	V		93030-076	92-O/11																		
Sept-10-97	411	?		V		95077 #199	92-O/9																	Og	
Sept-10-97	412	?	2 polygons with same #	V		95077 #199	92-O/9																		
Sept-10-97	501	?		V																					
Sept-10-97	502	?		V																					
Sept-10-97	504	?		V																					
Sept-10-97	505	?		V		93028 #197																			
Sept-10-97	78	273/274		V		93049 #048	92-O/11																		Wn
Sept-10-97	168	400/401		V		93031 #065	92-O/11																		Wn
Sept-10-97	228	485/490		V		93028 #031	92-O/10																		Wn
Sept-10-97	255	543/545		V		93028 #183	92-O/10																		Wn
Sept-10-97	256	546/555		V		93028 #183	92-O/10																		Ht/Wn
Sept-10-97	412	870/867/864/865/881/886/907		V		95077 #199	92-O/9																		Ri
Sept-9-97	295	617	Jamieson Meadows	F (field)		93028 #189	92-O/10	Roll 3 #19	IDFd k4																Ht
Sept-9-97	309a	629	309a	F (field)		93028 #189	92-O/10	Roll 3 #23																	Saline meadow
Sept-9-	309b	629	309b	F (field)		93028	92-O/10		IDFd																

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97						#189			k4															
Sept-9-97	309c	629	309c	F (field)		93028 #189	92-O/10		IDFd k4															Wn
Sept-9-97	297	654	Jamieson Meadows	F (field)		93028 #189	92-O/10	Roll 3 #19																Wn
Sept-9-97	337	669	Vedan Creek Area	F (field)		93028 #191	92-O/10																	
Sept-9-97	336	671	Vedan Creek Area	F (field)		93028 #191	92-O/10	Roll 3 #24																Wn
Sept-9-97	383a	783	383a	F (field)		95079 #119	92-O/9	Roll 3 #13, 14	IDFx m-34															Ht
Sept-9-97	383b	783	West of Fraser River (383b)	F (field)		95079 #119	92-O/9	Roll 3 #15	IDFx m-33															
Sept-9-97	500b	783	West of Fraser River (500b)	F (field)		95079 #119	92-O/9	Roll 3 #18 background																
Sept-9-97	383c	784	West of Fraser River (383c)	F (field)		95079 #119	92-O/9	Roll 3 #18	IDFx m															
Sept-9-97	500a	784	West of Fraser River (500a)	F (field)		95079 #119	92-O/9	Roll 3 #16, 17	IDFx m															
Sept-9-97	403b	855	East of Fraser River (403b)	F (field)		95077 #201	92-O/9		BGx h3															
Sept-9-97	403c	855	East of Fraser River (403c)	F (field)		95077 #201	92-O/9		BGx h3- 02															
Sept-9-97	403a	856	East of Fraser River (403a)	F (field)		95077 #201	92-O/9	Roll 3 #10	BGx h3															Ht/Sv
Sept-9-97	402a	859	East of Fraser Valley (402a)	F (field)		95077 #201	92-O/9	Roll 3 #7	BGx h3- 01															Ht
Sept-9-97	402b	859	East of Fraser Valley (402b)	F (field)		95077 #201	92-O/9	Roll 3 #8, 9	BGx h3- 37															
Sept-9-97	321	608	Large wetland complex	V		93028 #189	92-O/10																	Ht
Sept-9-97	323	609	Large wetland complex	V		93028 #189	92-O/10																	Ht
Sept-9-97	324	610	Large wetland complex	V		93028 #189	92-O/10																	Ht
Sept-9-97	325	611	Large wetland complex	V		93028 #189	92-O/10																	Wn
Sept-9-97	312	634	Large wetland complex	V		93028 #189	92-O/10																	Og
Sept-9-97	315	647	Large wetland complex	V		93028 #189	92-O/10																	Wn

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Sept-9-97	314	648	Large wetland complex	V		93028 #189	92-O/10																	Ht
Sept-9-97	298	655	Jamieson Meadows (to rear of 295)	V		93028 #189	92-O/10																	Ht
Sept-9-97	332	668	Vedan Creek Area	V		93028 #191	92-O/10																	Wn
Sept-9-97	339	670	Vedan Creek Area	V		93028 #191	92-O/10																	Ht
Sept-9-97	342	682	Vedan Creek Area	V		93028 #193	92-O/10																	Ht
Sept-9-97	343	683	Vedan Creek Area	V		93028 #193	92-O/10																	Wn
Sept-9-97	345	686	Vedan Creek Area	V		93028 #193	92-O/10																	Wn
Sept-9-97	352	689		V		93028 #195	92-O/10																	Wn
Sept-9-97	355	696		V		93028 #195	92-O/10																	
Sept-9-97	359	703		V		93028 #195	92-O/10																	
Sept-9-97	371	743		V		95077 #210	92-O/9																	Og
Sept-9-97	374	766		V		95076 #117	92-O/9																	Ri/Og
Sept-9-97	375	770		V		95076 #117	92-O/9																	Og
Sept-9-97	376	771		V		95076 #117	92-O/9																	Og
Sept-9-97	378	772		V		95076 #117	92-O/9																	Ht
Sept-9-97	*379	774	Two polygons with same number	V		95076 #117	92-O/9																	Og
Sept-9-97	*379	777	Two polygons with same number	V		95079 #119	92-O/9																	Ht
Sept-9-97	383d	784	West of Fraser River (383d)	V		95079 #119	92-O/9																	
Sept-9-97	389	791	Just west of Fraser River	V		95077 #203	92-O/9	Roll #14	3	IDFx m														Ht
Sept-9-97	393	803	Just west of Fraser River	V		95077 #203	92-O/9			BGx w2														Sv
Sept-9-97	400	830	East of Fraser River	V		95077 #201	92-O/9			BGx h3														Ht
Sept-9-97	320	1070	Large wetland complex	V		93028 #189	92-O/10																	
Sept-9-97	*381	?	Two polygons with same number	V		95079 #119	92-O/9																	
Sept-9-97	353	697/698		V		93028 #195	92-O/10	Roll 3 #25																Wn
Sept-9-97	367	748/740		V		95077	92-O/10																	Og

Date	Original Polygon	Current Polygon	Location Description	F(field)	S.E.I.	Air Photo	Map sheet	Photo	BEC	% slope	Aspect	Moist.	Nutrient	Elev.	Meso slope	Drain age	Forested	Non-Forested	Soil	Dist. History	Dist. History	Adj. land uses	Known threats	Eco.	
M/D/YR	#	#		V(visual)	Form	30BC C#	(1:50,000)	Roll/ Print#				Regime	Regime				Site Assoc.	Eco systems		(natural)	(anthropogenic)			Typed	
97						#210																			

October 1998 Reconnaissance - SEI Mapping - Transmission Corridor

Plot No.	Polygon #	Photo # (30BC C-)	Surveyors	Date	Eco section	BEC Unit	Site Series	Struc. Stage	Polygon summary	Elev.	Slope	Aspect	Slope Pos.	Disturbance
aircall	157 on airphoto		KB/GR/TT	98-10-22										horse outfitting trails; atv tracks
aircall	175 on airphoto		KB/GR/TT	98-10-22										
aircall	166 on airphoto		KB/GR/TT	98-10-22										
aircall	453	93030-076	KB/GR/TT	98-10-22					6SF5M, 4DS3bB					
V1	58		KB/GR/TT	98-10-22					8WS3a 2SH6					
V2	53		KB/GR/TT	98-10-22					LG7					
V3	224		KB/GR/TT	98-10-22										
V4	451		KB/GR/TT	98-10-22					7DS3bB 2SF4C 1BF2					
V5	459		KB/GR/TT	98-10-22										high cattle use
aircall	31		GR/KB	98-10-23										vehicle tracks, grazing, roads
V1	n/a	95077-205	GR/KB	98-10-23										will likely be logged due to proximity of trasmission lines
V10	803	95077-203	GR/KB	98-10-23										minor cattle use
V11	740	95077-	GR/KB	98-10-23				7t (vets)					LW	
V12	1019	95079-139	GR/KB	98-10-23										
V2	783	95077-205	GR/KB	98-10-23										cattle grazing, fence, road
V3	n/a	95077-205	GR/KB	98-10-23							5			selectively logged
V4	n/a	95077-203	GR/KB	98-10-23							10		LW	ungulate highway
V5	791	95077-203	GR/KB	98-10-23										cattle use (mineral lick)
V6	791	95077-203	GR/KB	98-10-23										similar values to polygon 783
V7	818	95077-203	GR/KB	98-10-23									TO	
V8	n/a	95077-203	GR/KB	98-10-23										Fd vets with fire scars

Plot No.	Polygon #	Photo # (30BC C-)	Surveyors	Date	Eco section	BEC Unit	Site Series	Struc. Stage	Polygon summary	Elev.	Slope	Aspect	Slope Pos.	Disturbance
V9	821	95077-203	GR/KB	98-10-23										rare cattle occurrence
VH1	895		HR/TT	98-10-23										extensive cattle degradation
VH10	877		HR/TT	98-10-23										
VH11	878		HR/TT	98-10-23										very high cattle use
VH12	876		HR/TT	98-10-23					4AS4 3DP6 3WN2					DP has been selectively logged
VH13	874		HR/TT	98-10-23					7AS4 3WN2					
VH14 (5b)	873		HR/TT	98-10-23					3DP6 2WO2					DP is selectively logged
VH15	872		HR/TT	98-10-23					9WN2 1DP6					cows and other animals digging for water from shallow seepage spots
VH16 (6b)	859		HR/TT	98-10-23					7WN2 3PL2					grazing, hoof prints; high amount of exposed soil
VH17	851		HR/TT	98-10-23					7DJ6 3WO2					
VH18	852		HR/TT	98-10-23					9PW2 1WN2					
VH19	966		HR/TT	98-10-23										cows in water at edge; line should shift to north away from lake
VH2	896		HR/TT	98-10-23					8DJ5 2DW6					old fire; cattle grazing
VH20 (8b)	967		HR/TT	98-10-23					4OW 4WJ2 2BF2					heavily grzed and road
VH21(9 b)	923		HR/TT	98-10-23					8BW2 1BU2 1MS3a					adjacent sites logged; infrequent use of road; very important to avoid TC through this area
VH3	895		HR/TT	98-10-23										road
VH4	894		HR/TT	98-10-23					6NP2, 2NG2, 2DP6					grasses low from grazing
VH5 (2b)	1081		HR/TT	98-10-23										
VH6	889		HR/TT	98-10-23										flagged for logging
VH7 (3b)	889		HR/TT	98-10-23										some cattle effect; influence/impact from road
VH8	943		HR/TT	98-10-23					5NP5 3NP2 2NG2					logged and cattle grazing
VH9 (4b)	877		HR/TT	98-10-23					8WN2 2AS4					logged; cattle grazing; atv trail



Appendix 5

CORRIDOR: POLYGON DATABASE-DIGITAL FORM

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Appendix 6

MAP LEGEND AND CODES USED IN POLYGON DATABASES

1. MAP LEGEND FOR CORRIDOR

PROSPERITY PROJECT

SENSITIVE ECOSYSTEM MAPPING

PROPOSED TRANSMISSION CORRIDOR

For: Taseko Mines Ltd., Vancouver, British Columbia

By: Madrone Consultants Ltd. January, 1999

Scale: 1:20,000

ECOREGION

Fraser Plateau Ecosections

CAB: Cariboo Basin

CHP: Chilcotin Plateau

FRB: Fraser River Basin

BIOGEOCLIMATIC UNITS

BGxh3: Bunchgrass Very Hot Dry, Fraser Variant

BGxw2: Bunchgrass Very Dry Warm, Alkali Variant

ESSFxv2: Engelmann Spruce-Subalpine Fir Very Dry Very Cold, Big Creek Variant

IDFdk3: Interior Douglas-Fir Dry Cool, Fraser Variant

IDFdk4: Interior Douglas-Fir Dry Cool, Chilcotin Variant

IDFxm: Interior Douglas-Fir, Very Dry Mild subzone

MSxv: Montane Spruce, Very Dry Very Cold subzone

SBPSmk: Sub-Boreal Pine-Spruce, Moist Cool subzone

SBPSxc: Sub-Boreal Pine-Spruce, Very Dry Cold subzone

ECOSYSTEM UNITS

Site level polygons delineate ecosystem units. Each ecosystem is assigned a two-letter symbol; for most vegetated units these are directly equivalent to specific site series, as listed in the Provincial Site Series Codes List (Ministry of Environment, Land and Parks, Nov. 2, 1998). Additional symbols are assigned to non-forested units according to *Standard for Terrestrial Ecosystem Mapping in British Columbia* (RIC, 1998). Those ecosystems assigned an asterisk were identified from field data conducted in the Mine site area.

In addition, site modifiers and structural stages are identified where appropriate.

Ecosystem Units of the BGxh3

SYMBOL	UNIT NAME	SITE SERIES
DJ	Douglas fir – Rocky Mountain juniper	02
ES	Exposed soil	
JR	Rocky Mountain juniper – Rabbitbrush	35
RI	River	
SC	Big sagebrush – Prickly-pear cactus	31
SS	Big sagebrush – Sand dropseed	33
SW	Bluebunch wheatgrass – Big sagebrush	01
WA	Bluebunch wheatgrass – Round leaved alumroot	39
WD	Bluebunch wheatgrass – Sand dropseed	34b
WS	Bluebunch wheatgrass – Pasture sage	34a

Ecosystem Units of the BGxw2

SYMBOL	UNIT NAME	SITE SERIES
AS	Trembling aspen-Snowberry-Kentucky bluegrass	06
DG	Fd – Spike-like goldenrod – Pelt lichen	02
DJ	Fd-Rocky Mountain juniper-Bluebunch wheatgrass	03
DM	Trembling Aspen – Douglas maple	05
DP	Fd-Pinegrass – Red stemmed feathermoss	04
ES	Exposed soil	
PL	Short-awned porcupinegrass-Lemonweed	38
PW	Pasture sage-Bluebunch wheatgrass	34
WN	Bluebunch wheatgrass-Needle-and-thread grass	01A
WO	Bluebunch wheatgrass-Nodding onion	37

Ecosystem Units of the ESSFv2

SYMBOL	UNIT NAME	SITE SERIES
AC	Bl – Arnica – Cladonia	01
BF	Beaked sedge fen	W12
FR	Bl – Rhododendron – Crowberry	06
FT	Bl – Twinberry – Hellebore	09
JG	BIPa – Juniper – Grouseberry	04
KG	Kinnikinnick – Grass	00
OW	Shallow Open Water	
SW*	Spatterdock – Water smartweed	00
(from SBPSxc subzone)		
WJ	BIPa – Juniper – Cladonia	02
WM	Grey – leaved willow – Moss shrub carr	W5

Ecosystem Units of the IDFd3

SYMBOL	UNIT NAME	SITE SERIES
AF	Alkaligrass-Foxtail barley meadow	W2
AG	Arrowgrass marsh	W12
AR	Aspen - Rose	
AS	Awned sedge fen – marsh	W8
BU	Great bulrush marsh	W14
BW	Beaked sedge – Water sedge fen	W9
CT	Cattail marsh	W13
DJ	Fd - Juniper – Peltigera	03
DM	Fd – Feathermoss – Step moss	05
DP	Fd – Pinegrass – Aster	06
DW	Fd – Bluebunch wheatgrass – Needlegrass	04
LA	Lake	
LP	FdPI – Pinegrass - Feathermoss	01
MS	Maccall's willow – Beaked sedge fen	W5
MU	Mudflat Sediment	
OW	Shallow Open Water	
PP	Short-awned Porcupinegrass – Pussytoes	00
RO	Rock Outcrop	
SH	Sxw – Horsetail – Glow moss	09
SR	SxwFd – Prickly rose – Sedge	07
SS	SxwFd – Prickly rose – Sarsaparilla	08
TS	Tall willow – Sartwell's sedge swamp	W6
WY	Bluebunch wheatgrass – Yarrow	00

Ecosystem Units of the IDFdk4

SYMBOL	UNIT NAME	SITE SERIES
AF	Nuttall's alkaligrass-Foxtail barley wet meadow	W2
AR	Trembling aspen – Rose	00
BU	Great bulrush marsh	W14
CF	Cultivated Field	
CL	Cliff	
DJ	Fd - Juniper – Saskatoon	03
DM	Fd – Feathermoss – Step moss	07
DT	Dandelion – Timber oat-grass (from the SBPSxc)	00
DW	Fd – Bluebunch wheatgrass – Pinegrass	05
GB	Gravel Bar	
GL	Grass – Large-leaved avens (from SBPSxc)	00
JP	Fd – Juniper – Peltigera	02
LC	PI – Kinnikinnick – Cladonia	06
LP	FdPI – Pinegrass - Feathermoss	01
MS	Maccall's willow – Beaked sedge fen	W5
MU	Mudflat Sediment	
NR	Spreading needlegrass – Baltic rush: Kentucky blue grass seral assoc.	00
OW	Shallow Open Water	
SF	Sxw – Feathermoss – Brachythecium	09
SH	Sxw – Horsetail – Glow moss	10
SM	Beaked sedge – Water sedge marsh	00
SS	SxwFd – Scrub birch - Feathermoss	08
SW*	Spatterdock – Water smartweed	00
(from SBPSxc zone)		
TS	Tall Willow – Sartwell's sedge fen	W6
WB	Bluebunch wheatgrass – Balsamroot	00

Ecosystem Units of the IDFXm

SYMBOL	UNIT NAME	SITE SERIES
AR	Trembling aspen - Prairie rose	00
CL	Cliff	
CM	Common spike-rush marsh	00
DJ	Fd - Juniper – Cladonia	03
DM	Fd – Feathermoss – Step moss	05
DP	Fd – Pinegrass – Feathermoss	01
DR	Fd – Ricegrass – Feathermoss	06
DS	Fd – Bluebunch wheatgrass – Pasture sage	04
DW	Fd – Bluebunch wheatgrass – Penstemon	02
GR	Red glasswort – Alkali bulrush wet meadow	00
NG	Spreading needlegrass – Sticky purple geranium	37
NP	Spreading needlegrass – Pussytoes	35
NR	Spreading needlegrass – Baltic rush	38
OW	Shallow Open Water	
PP	Short-awned porcupinegrass – Pussytoes	34

RS	Fd-Prickly rose – Sarsaparilla	07
SH	Sxw – Horsetail	09
SM	Beaked sedge – Water sedge marsh	00
SS	SxwFd - Snowberry – Prickly rose	08
TS	Tall willow – Sedge swamp	W5
WP	Bluebunch wheatgrass – Pasture sage	32
WY	Bluebunch wheatgrass – Yarrow	33

Ecosystem Units of the MSxv

SYMBOL	UNIT NAME	SITE SERIES
BF	Beaked sedge fen	W12
BL	Bluebunch wheatgrass – Lichen	00
GK	PI – Grouseberry – Kinnikinnick	04
GL	Grass – Large-leaved avens	00
KG	Kinnikinnick – Grass	00
LG	PI – Grouseberry – Feathermoss	01
LK	PI – Kinnikinnick - Cladonia	03
LT	Trapper's tea – Crowberry	05
OW	Shallow Open Water	
SC	Sxw – Crowberry – Knight's plume	06
SG	Sxw – Crowberry – Glowmoss	07
SH	Sxw – Horsetail – Crowberry	
	Sxw – Labrador tea – Willow	08/09
SW*	Spatterdock – Water smartweed	00
(from SBPSxc zone)		
WH*	Willow – Horsetail	00
WM	Grey – leaved willow – Moss shrub carr	W5
WS	Bog willow – Sedge low shrub fen	W8

Ecosystem Units of the SBPSmk

SYMBOL	UNIT NAME	SITE SERIES
BF	Beaked sedge fen	W12
FA	Fd – Pinegrass – Aster	03
GL	Grass – Large leaved avens	00
LP	PI – Pinegrass – Arnica	01
ST	Sxw – Twinberry	06

Ecosystem Units of the SBPSxc

SYMBOL	UNIT NAME	SITE SERIES
BF	Beaked sedge fen	W12
CF	Cultivated Fields	
DS	Drummond's willow-Sedge swamp	W7
DT*	Dandelion-Timber oat-grass	00

GL*	Grass-Large-leaved avens	00
KG*	Kinnikinnick – Grass	00
LA	Lake	
LC	PI-Kinnikinnick-Cladonia	02
LK	PI-Kinnikinnick-Feathermoss	01
OW	Shallow Open Water	
RO	Rock Outcrop	
RP	Road Surface	
SB	Sxw-Scrub birch-Fen moss	03
SF	Sxw-Scrub birch-Feathermoss	04
SH	Sxw-Horsetail-Glow moss	05
SW*	Spatterdock-Water smartweed	00
WM	Grey-leaved willow-Moss shrub carr	W5(and W4)
WS	Bog willow-Sedge low shrub fen	W8

STRUCTURAL STAGES AND SITE MODIFIERS

No. Structural Stage

1	Non-vegetated/sparse
2	Herb
3	Shrub/Herb
3a	Low Shrub
3b	Tall Shrub
4	Pole/Sapling
5	Young Forest
6	Mature Forest
7	Old Forest

Site Modifiers

c	coarse textured soils
r	ridge
d	deep soils (>100cm to bedrock)
s	shallow soils (20-100cm to bedrock)
g	gullying occurring
v	very shallow soil (<20 cm to bedrock)
h	hummocky
w	warm aspect (135°-285°, 25-100% slope)
k	cool aspect (285°-135°, 25-100% slope)
z	very steep, warm aspect (135°-285°, fan or cone >100% slope)
n	fan or cone >100% slope)

CITATION

Ministry of Environment, Land and Parks. 1998. Provincial Site Series Code List. Located at ftp://wldux2.env.gov.bc.ca/pub/TEM/map_code.xls. November 2, 1998.

Resources Inventory Committee. 1998. *Standard for Terrestrial Ecosystem Mapping in British Columbia*. Ecosystems Working Group, Terrestrial Ecosystems Task Force. May, 1998.

2. SITE MODIFIERS FOR ATYPICAL CONDITIONS

(as per "Table 3.2" from the *Standard for Terrestrial Ecosystem Mapping in British Columbia*, Resources Inventory Committee, 1995.)

Code	Criteria
<i>Topography</i>	
a	active floodplain ¹ – the site series occurs on an active fluvial floodplain (level or very gently sloping surface bordering a river that has been formed by river erosion and deposition), where evidence of active sedimentation and deposition is present.
g	gullying ¹ occurring – the site series occurs within a gully, indicating a certain amount of variation from the typical, or the site series has gullying throughout the area being delineated.
h	hummocky ¹ terrain (optional modifier) – the site series occurs on hummocky terrain, suggesting a certain amount of variability. Commonly, hummocky conditions are indicated by the terrain surface expression but occasionally they occur in a situation not described by terrain features.
j	gently slope – the site series occurs on gently sloping topography (less than 25% in the interior, less than 35% in the CWH, CDF, and MH zones).
k	cool aspect – the site series occurs on cool, northerly or easterly aspects (285° – 135°), on moderately steep slopes (25%–100% slope in the interior and 35%–100% slope in the CWH, CDF, and MH zones).
n	fan ¹ – the site series occurs on a fluvial fan (most common), or on a colluvial fan or cone.
q	very steep cool aspect – the site series occurs on very steep slopes (greater than 100% slope) with cool, northerly or easterly aspects (285°–135°).
r	ridge ¹ (optional modifier) – the site series occurs throughout an area of ridged terrain, or it occurs on a ridge crest.
t	terrace ¹ – the site series occurs on a fluvial or glaciofluvial terrace, lacustrine terrace, or rock cut terrace.
w	warm aspect – the site series occurs on warm, southerly or westerly aspects (135°–285°), on moderately steep slopes (25%–100% slope in the interior and 35%–100% slope in the CWH, CDF, and MH zones).
z	very steep warm aspect – the site series occurs on very steep slopes (greater than 100%) on warm, southerly or westerly aspects (135°–285°).

Moisture

- x drier than typical (optional modifier) – describes part of the range of conditions for circummesic ecosystems with a wide range of soil moisture regimes or significantly different site conditions. For example, SBSmc2/01 (Sxw–Huckleberry) has three site phases described, and the submesic phase can be labeled with the “drier than average” modifier (e.g., SBx). This code should be applied only after consultation with the Regional Ecologist.
- y moister than typical (optional modifier) – describes part of the range of conditions for circummesic ecosystems with a wide range of soil moisture regimes or significantly different site conditions. For example, SBSmk1/06 (Sb–Huckleberry–Spirea) is “typically” described as submesic to mesic. When this site series is found on subhygric or hygric sites, the “y” modifier is used (e.g., Bhy). This code should be applied only after consultation with the Regional Ecologist.

Code**Criteria***Soil*

- c coarse-textured soils² – the site series occurs on soils with a coarse texture, including sand loamy sand; and also sandy loam, loam, and sandy clay loam with greater than 70% **coarse fragment volume**.
- d deep soil – the site series occurs on soils greater than 100 cm to bedrock.
- f fine-textured soils² – the site series occurs on soils with a fine texture including silt and silt loam with less than 20% coarse fragment volume; and clay, silty clay, silty clay loam, clay loam, sandy clay and heavy clay with less than 35% coarse fragment volume.
- m medium-textured soils – the site series occurs on soils with a medium texture, including sandy loam, loam and sandy clay loam with less than 70% coarse fragment volume; silt loam and silt with more than 20% coarse fragment volume; and clay, silty clay, silty clay loam, clay loam, sandy clay and heavy clay with more than 35% coarse fragment volume.
- p peaty material – the site series occurs on deep organics or a peaty surface (15–60 cm)³ over mineral materials (e.g., on organic materials of sedge, spagnum, or decomposed wood).
- s shallow soils – the site series occurs where soils are considered to be shallow to bedrock (20–100 cm).
- v very shallow soils – the site series occurs where soils are considered to be very shallow to bedrock (less than 20 cm).

¹ Howes and Kenk, 1997

² Soil textures have been grouped specifically for the purposes of ecosystem mapping.

³ Canada Soils Survey Committee, 1987

3. STRUCTURAL STAGES AND CODES

(as per "Table 3.3" from the *Standard for Terrestrial Ecosystem Mapping in British Columbia*, Resources Inventory Committee, 1995.)

Structural Stage	Description
<i>Post-disturbance stages or environmentally induced structural development</i>	
1 Sparse/bryoid²	Initial stages of primary and secondary succession; bryophytes and lichens often dominant, can be up to 100%; time since disturbance less than 20 years for normal forest succession, may be prolonged (50–100+ years) where there is little or no soil development (bedrock, boulder fields); total shrub and herb cover less than 20%; total tree layer cover less than 10%.
Substages	
1a Sparse ²	Less than 10% vegetation cover;
1b Bryoid ²	Bryophyte- and lichen-dominated communities (greater than ½ of total vegetation cover).
<i>Stand initiation stages or environmentally induced structural development</i>	
2 Herb²	Early successional stage or herbaceous communities maintained by environmental conditions or disturbance (e.g., snow fields, avalanche tracks, wetlands, grasslands, flooding , intensive grazing, intense fire damage); dominated by herbs (forbs, graminoids, ferns); some invading or residual shrubs and tress may be present; tree layer cover less than 10%, shrubby layer cover less than or equal to 20% or less than 1/3 of total cover; time since disturbance less than 20 years for normal forest succession; may herbaceous communities are perpetually maintained in this stage.
Substages	
2a Forb-dominanted ²	Herbaceous communities dominated (greater than ½ of the total herb cover) by non-graminoid herbs, including ferns.
2b Graminoid-dominanted ²	Herbaceous communities dominated (greater than ½ of the total herb cover) by grasses, sedges, reeds, and rushes.
2c Aquatic ²	Herbaceous communities dominated (greater than ½ of the total herb cover) by floating or submerged aquatic plants; does not include sedges growing in marshes with standing water (which are classed as 2b).
2d Dwarf shrub ²	Communities dominated (greater than ½ of the total herb cover) by dwarf woody species such as <i>Phyllodoce empetriformis</i> , <i>Cassiope mertensiana</i> , <i>Cassiope tetragona</i> , <i>Arctostaphylos arctica</i> , <i>Salix reticulata</i> , and <i>Rhododendron lapponicum</i> . (See list of dwarf shrubs assigned to the herb layer in the <i>Field Manual for Describing Terrestrial Ecosystems</i>).
3 Shrub/Herb³	Early successional stage or shrub communities maintained by environmental conditions or disturbance (e.g., snow fields, avalanche tracks, wetlands, grasslands, flooding , intensive grazing, intense fir damage); dominated by shrubby vegetation; seedlings and advance regeneration may be abundant; tree layer cover less than 10%; shrub layer cover greater than 20% or greater than or equal to 1/3 of total cover.

Structural Stage	Description
Substages	
3a Low shrub ³	Communities dominated by shrub layer vegetation less than 2 m tall; may be perpetuated indefinitely to environmental conditions or repeated disturbance; seedlings and advance regeneration may be abundant; time since disturbance less than 20 years for normal forest succession.
3b Tall shrub ³	Communities dominated by shrub layer vegetation that are 2–10 m tall; may be perpetuated indefinitely by environmental conditions or repeated disturbance; seedlings and advance regeneration may be abundant; time since disturbance less than 40 years for normal forest succession.
<i>Stem exclusion stages</i>	
4 Pole/Sapling⁴	Trees greater than 10m tall, typically dense stocked, have overtopped shrub and herb layers; younger stands are vigorous (usually greater than 10–15 years old); older stagnated stands (up to 100 years old) are also included; self-thinning and vertical structure not yet evident in the canopy – this often occurs by age 30 in vigorous broadleaf stands, which are generally younger than coniferous stand at the same structural stage; time since disturbance ins usually less than 40 years for normal forest succession; u to 100+ years for dense (5,00015,000+ stems per hectare) stagnant stands.
5 Young Forest⁴	Self-thinning has become evident and the forest canopy has begun differentiation into distinct layers (dominant, main canopy, and overtopped); vigorous growth and a more open stand than in the pole/sapling sate; time since disturbance is generally 40–80 years but may begin as early as age 30, depending on tree species and ecological conditions.
<i>Understory reinitiation stage</i>	
6 Mature Forest⁴	Trees established after the last disturbance have matured; a second cycle of shade tolerant trees may have become established; understories become well developed as the canopy opens up; time since disturbance is generally 80–140 years for biogeoclimatic group A ⁵ and 80–250 years for group B ⁶ .
<i>Old-growth stage</i>	
7 Old Forest⁴	Old, structurally complex stands composed mainly of shade-tolerant and regenerating tree species, although older seral and long-lived trees from a disturbance such as fire may still dominate the upper canopy; snags and coarse woody debris in all stages of decomposition typical, as are patchy understories; understories may include tree species uncommon in the canopy, due to inherent limitations of these species under the given conditions; time since disturbance generally greater than 140 years for biogeoclimatic group A ⁵ and greater than 250 years for group B ⁶ .
1	In the assessment of structural state, structural features and age criteria should be considered together. Broadleaf stands will generally be younger than coniferous stands belonging to the same structural stage.
2	Substages 1a, 1b, and 2a-d should be used if photo interpretations is possible, otherwise, stage 1 and 2 should be used.
3	Substages 3a and 3b may, for example, include very old krummholz less than 2 m tall and very old, low productivity stands (e.g., gob woodlands) less than 10 m tall, respectively. Stage 3, without additional substages, should be used for regenerating forest communities that are herb or shrub dominated, including shrub layers consisting of only 10%-20% tree species, and undergoing normal succession toward climax forest (e.g., recent cut-over areas or burned areas).
4	Structural stages 4–7 will typically be estimated from a combination of attributes based on forest inventory maps and aerial photography. In addition to structural stage designation, actual age for forested units can be estimated and included as an attribute in the database, if required.
5	Biogeoclimatic Group A includes BWBSdk, BWBSmw, BWBSwk, BWBSvk, ESSFdc, ESSFdk, ESSFdv, ESSFxc, ICHdk, ICHdw, ICHmk1, ICHmk2, ICHmw3, MS (all subzones), SBPS (all subzones), SBSdh, SBSdk, SBSdw, SBSmc, SBSmh, SBSmk, SBSmm, SBSmw, SBSwk1 (on plateau), and SBSwk3.
6	Biogeoclimatic Group B includes all other biogeoclimatic units

4. SITE DISTURBANCE CODES

(as per item 2-14 in Ministry of Forests 1996)

ATM Atmosphere related effects:

- p Atmospheric pollution (specify type, e.g., toxic gases, acid rain)
- e Climatic extremes (specify type, e.g., temperature – cold, heat; precipitation – glaze ice, hail, snow)
- w Windthrow

LOG Forest harvesting:

- c Clearcut logging (no slashburn unless indicated)
- p Harvesting of native poant crops (mushrooms, salal picking, etc.)
- s Selective logging (including shelter cut)
- l Land clearing (for logging or other development, including abandoned agriculture.)

DIS Disposals:

- c Chemical spill or disposal
- e Effluent disposal
- m Mine spoils
- o Oil spill or disposal
- r Radioactive waste disposal or exposure

SOI Soil disturbance

- r Road bed, abandoned
- t Railway, abandoned
- l Cultivation (continued disturbance of the vegetation and/or the soil)
- e Excavation
- s Scarification
- c Compaction

FIR Fires:

- s Severe surface fire
- g Light surface (ground) fire
- i Repeated severe surface fires (intense)
- r Repeated light surface fires
- l Burning of logging slash
- c Overstory crown fire

BIO Biotic (plant and animal) effects (specify animal or plant in Notes)

- b Beaver tree cutting
- p Disease (excluding insects)
- d Domestic grazing/browsing
- e Excrement accumulation (other than that normally associated with grazing and browsing)
- i Insect kill
- v Aggressive vegetation (usually introduced)
- w Wildlife grazing/browsing (specify animals)

TER Terrain related effects:

- a Avalanching
- e Eolian (active deflation or deposition)

- d Recent deglaciation
- q Rock quarrying (including openpit mines)
- s Terrain failures (active/recent slumps, slides, solifluction, etc.)
- v Volcanic activity

MOD Plant or site modification effects:

- f Fertilization (specify fertilizer)
- i Irrigation
- t Planted or seeded to trees
- s Planted/seeded to shrubs
- h Planted/seeded to herbs
- g Planted or seeded to grasses
- c Herbicide (chemical) use

WAT Water related effects:

- i Inundation (including temporary inundation resulting from beaver activity)
- s Temporary seepage (usually man-induced; excludes intermittent seepage resulting from climatic conditions)
- d Water table control (diking, damming)
- e Water table depression (associated with extensive water extraction from wells)

5. **SOURCE** (as per Table 2-5 Ecological Data Committee 1998)

Code	Class Name	Definition
E	Ecosystem Field plots	1998 versions – FS882 (1-7) 1996 versions – FS882 Previous to 1996 – Luttmerding et al. (DEIF, 1990).
G	Ground Inspection Form (1998)	Revised version of the 1996 Visual Inspection Form. Quick plots where data is recorded to confirm the identification of the ecosystem units and provide some data for characterizing ecosystem attributes e.g. dominant/indicator vegetation list helps to characterize structural stages. Done on the ground by walking through a site and characterizing the site, confirming an existing polygon designation, or confirming existing polygon designation along with providing added site information for clarification during the mapping process.
V	Visual Inspection	Site visit to the polygon: Walking or driving with field notes taken.
A	Air Visual Inspection	Site visit flying with field notes taken.
P	Air Photos	



Appendix 7
CORRIDOR: ECOSYSTEM DESCRIPTIONS

Ecosystem Descriptions

Descriptions are presented by zone and then within each zone are categorized as forested or shrub and herb dominated units. Sparsely vegetated, non-vegetated, and anthropogenic units for the whole study area are then described. All plant species identified in the study area are listed by their common and scientific names in Appendix 13.

The biogeoclimatic subzones and variants are listed alphabetically. The ecosystem descriptions are separated into forested, grassland, and wetland units for the BG and IDF biogeoclimatic zones. For all other zones they are separated into two types of units; forested, and shrub and herb dominated units. A description of structural stages and site modifiers can be found Appendix 6. The status of the ecosystem refers to its rarity. Red- and blue-listed ecosystems are shown. However, the correlation between the ecosystems defined in the Provincial Site Series Code List and those listed by the CDC is not always clear. For this reason several ecosystems are listed as potentially rare by the Region after discussions with MOF and MELP staff in Williams Lake.

Bunchgrass Biogeoclimatic Zone (BG)

BGxh3 (very hot dry subzone, Fraser variant)

BG xh 3 – Forested Units

DJ 02 Douglas fir - Rocky Mountain juniper

Structural Stage: 6

Site Modifiers mapped: s

Status: REGIONAL

These sites are common throughout the BGxh3. This site series is found on steep north and northeast cool aspects but can also be found on cool, shaded toe slopes. More specifically, this ecosystem also occurs in deep gullies, in the bottoms of deep gullies where active floodplains exist, and in cool, shaded canyons on gentle slopes, including fans, and terraces. Soils are deep and typically medium textured but may be coarse. Usually vegetation covers most of the soil surface with less than 20% of the mineral soil exposed.

The forest canopy is open to moderately closed (10-40% cover) and dominated by Douglas fir with scattered Rocky Mountain juniper. The undergrowth is dominated by well-spaced bluebunch wheatgrass with few herbs, similar to those found in the /39 Site Series. Mosses, particularly stepmoss, dominate the nearly continuous (70-85%) moss and lichen layer. Pelt lichens (especially *Peltigera rufescens* and *P. canina*) are frequently present. The presence of an open Douglas fir canopy and the lack of dense shrubs found in riparian communities easily distinguish this unit from other units in the BGxh3.

BG xh 3 – Grasslands

JR 35 Rocky Mountain juniper – Rabbitbrush

Structural Stage: 2

Site Modifiers mapped: none

Status: REGIONAL

This ecosystem occurs on steep (>65%), east-facing slopes. Surficial materials are unconsolidated with eroded Regosolic soils, which are typically calcareous. Soils may be coarse and/or shallow. The soil moisture regime (SMR) is subxeric and the soil nutrient regime (SNR) ranges from submesotrophic to permesotrophic.

Mineral soil dominates these sites and vegetation is limited to widely scattered bluebunch wheatgrass clumps (0-2%), pasture sage, pulse milk-vetch and pale comandra. Widely scattered Rocky Mountain juniper, rabbitbrush, saskatoon, big sagebrush and an occasional small Douglas fir tree are also usually present. Mosses and lichens are virtually absent. Steep east aspects of the BGxh3/01 Site Series differ in that they are well vegetated and include good cover and diversity of lichens. The BGxh3/35 Site Series differs from other steep, eroded site units (/33 and 34b) by very sparse vegetation cover and the lack of lichens.

SC *31 Big Sagebrush – Prickly-pear cactus*

Structural Stage: 1b

Site Modifiers mapped: k, w

Status: RED?

This site series occurs on rock outcrops with shallow soils, as well as on bedrock and in shallow bedrock-dominated gullies. The sites are small to medium with a small total area but are widespread. They occur on gentle slopes on all aspects but they can also be found on steep slopes and very shallow soils. This site series is distinguished from other dry sites by its thin soils and abundant exposed bedrock. The SMR is very xeric to subxeric, and the SNR is submesotrophic to oligotrophic. Grazed areas tend to have more exposed mineral soil (>15%).

Scattered Douglas-fir trees can occur where there is fractured bedrock but for the most part this ecosystem is sparsely vegetated with scattered big sagebrush and often saskatoon. Forbs and grasses are usually sparse (2-25% cover). Bluebunch wheatgrass is the dominant species, but pasture sage, brittle prickly-pear cactus, junegrass, pussytoes, Holboell's rockcress, and lance-leaved stonecrop also occur where there is sufficient soil. Cover of herbs and cryptogams varies depending on the amount of soil present. The amount of exposed mineral soil is generally less than 15% on late seral and climax sites. Mosses and lichens commonly present include *Xanthoparmelia* sp., *Xanthoria elegans*, *Tortula* sp., and *Diploshisties muscorum*.

SS *33 Big Sagebrush – Sand dropseed*
 Structural Stage: 2, 3a
 Site Modifiers mapped: none
 Status: RED?

This ecosystem occurs on moderate to steep south and southwest facing slopes and is relatively common throughout the BGxh3. Soils are often coarse-textured gravel and are continuously eroding. Non-vegetated mineral soil usually dominated the site (30-90% cover). The SMR is xeric to subxeric and the SNR is mesotrophic to submesotrophic.

Vegetation can be quite variable (10-30% cover) depending on the amount of erosion. These sites are vegetated with scattered shrubs (big sagebrush and rabbitbrush) and herbs (sand dropseed, bluebunch wheatgrass, pasture sage, needle-and-thread grass, and lotus milk-vetch). Lichen cover is patchy and limited to early seral species (predominately *Psora* spp. and *Collema* spp.). These sites have much lower covers of bluebunch wheatgrass (0-12%) than BGxh3/34 sites (15-35%), and are best distinguished from BHxh3/34 and BGxh3/35 site series by slope aspect.

SW *01 Bluebunch wheatgrass – Big sagebrush*
 Structural Stage: 2, 3a
 Site Modifiers mapped: k, n
 Status: RED

This site series dominates the variant, occurring on approximately 60-70% of the landscape. It occurs on gentle slopes of all aspects but it can also be found on steep east and northwest facing slopes. In river canyons this ecosystem occurs commonly in gullies and on glaciofluvial fans and terraces. Soils are deep and medium-textured. Typically, the SMR is mesic while the SNR is mesotrophic.

Late seral and climax vegetation is dominated by vigorous, well-spaced clumps of bluebunch wheatgrass (25-85% cover). Big sagebrush is also abundant on sites that have not recently been burned. Other common plant species include junegrass, pussytoes, pasture sage, brittle prickly pear cactus, northern fairy-candelabra and lemonweed. Total plant cover is moderate to high (30-95%) but generally made up of relatively few species. Lichens, mosses and blue-green algae form a well-developed (30-80%) crust in the spaces between vascular plants. This crust includes low covers (0-20%) of mosses (such as *Tortula* sp. and *Hypnum* sp.) and a well developed (10-75%) lichen component dominated by *Cladonia cariosa*, *C. pyxidata* and *C. symphicarpa* with lesser amount of *C. chlorophaea*, *C. gracilis* and *C. phyllophora*. Pelt lichens (including *Peltigera didactyla*, *P. canina*, *P. ponojensis* and *P. rufescens*) are most common on steep E and steep NW slopes. In addition, seral lichens (*Diploshisties muscorum*, *Psora* spp., *Caloplaca* sp. and *Collema* spp.) are present with low cover (0-4%) and, as a result, mineral soil exposure is typically less than 30%.

South and west aspects usually have lower covers (20-25%) of bluebunch wheatgrass and are slower to recover from disturbance than steep east and northwest aspects.

This site series can be distinguished from BGxh3/35 by a greater abundance of lichens and mosses, greater overall vegetation cover (only 3% cover of herbs on 06) and the lack of Rocky Mountain juniper and rabbitbrush. It can be distinguished from BGxh3/36 by the lack of sand dropseed and needle-and-thread grass and from BGxh3/37 by the lack of needle-and-thread grass.

WA 39 Bluebunch wheatgrass - Round-leaved alumroot

Structural Stage: 2

Site Modifiers mapped: s

Status: RED?

This site series typically occurs on steep north and northeast aspects throughout the BGxh3. Slopes with this ecosystem may be gullied or terraced. Soils are deep and medium-textured, with the SMR ranging from mesic to subhygric and the SNR mesotrophic. These sites may also have coarse or fine-textured soils. There is very little exposed mineral soil, ranging from 2 to 14%.

Late seral and climax vegetation is dominated by abundant (35-70% cover) vigorous bluebunch wheatgrass. A well-developed litter layer typically occurs between the bunchgrass. Vegetation also includes junegrass and a relatively high diversity of forbs (including pussytoes, yarrow, northern fairy-candelabra, salsify, round-leaved alumroot, spike-like goldenrod, mariposa lily, western blue flax, old man's whiskers, woolly groundsel and cut-leaved anemone). The cryptogam layer is typically well developed and fills nearly all available space (30-90% cover) between vascular plants. It is dominated by several *Cladonia* spp. and includes some *Tortula* sp., *Diploshisties muscorum*, *Gimmia* sp. and scattered pelt lichens. Several lichens such as *Psora* spp. and *Collema* sp. are rarely present on these and other north aspect sites. This unit can be distinguished from steep E and NW slopes (/01) by a much greater diversity of herbs and less big sagebrush. Also, round-leaved alumroot, old man's whiskers, woolly groundsel, and spike-like goldenrod are more common on these sites.

WD 34b Bluebunch wheatgrass – Sand dropseed

Structural Stage: 2

Site Modifiers mapped: none

Status: RED?

This site series occurs on significant slopes on warm aspects. The soils are coarse-textured and are actively eroding. SMR is subxeric to submesic.

The above description was taken from the JMJ Holdings Ltd. map legend for the Terrestrial Ecosystem Mapping of the Cariboo Grasslands (July 1998). However, this ecosystem label does not appear in the accompanying report (JMJ Holdings Ltd., 1998) and does not correspond with the Provincial Site Series Code List (MELP, 1998).

WS *34b Bluebunch wheatgrass - Pasture sage*
Structural Stage: 2, 3a
Site Modifiers mapped: none
Status: RED?

These sites are common and distributed throughout the BGxh3. This ecosystem typically occurs on steep, eroded west-facing slopes. A large proportion of the surface consists of unvegetated mineral soil. Because of a high coarse fragment content soils are coarse-textured. The SMR is subxeric to submesic and the SNR is submesotrophic.

This phase has many of the same plant species that occur on BGxh3/34a although total vegetation cover is much less due to active erosion. Cover of bluebunch wheatgrass is generally low (5%) and other herbaceous species include scattered sand dropseed, pasture sage, brittle prickly-pear cactus and needle-and-thread grass. These sites include fewer species than those of the /34a phase. Slender hawksbeard is lacking and cryptogams are limited to low covers of seral lichens (*Collema*, *Psora*, *Caloplaca* sp., *Catapyrenium* spp.).

BGxw2 (very dry warm subzone, Alkali variant)

BG xw 2 – Forested

AS *06 Trembling aspen – Snowberry – Kentucky bluegrass*

Structural Stages Mapped: 5, 6

Site Modifiers mapped: s

Status: REGIONAL

These medium-sized sites can be considered uncommon, but occur throughout the BGxw2 usually situated in broad moist depressions but may be located in the dips of hummocky terrain. This ecosystem typically occurs on gently sloping aeolian veneers over till blankets. Soils are deep and medium-textured with a mesic to subhygric SMR.

These sites are usually surrounded by a narrow band of site series /39. Vegetation consists of mature stands of trembling aspen and a dense shrub layer of snowberry, wood rose and occasionally some saskatoon. Because of thick buildup of deciduous leaf litter, the herbaceous vegetation is usually sparse. It often includes Kentucky bluegrass, pinegrass, scattered forbs and occasionally very low moss cover. Young dense stands of this site series are often very shrubby with few herbs or mosses. The wettest sites in this site series frequently have pussy willow and sedges in addition to the above species.

DG *02 Fd – Spike-like goldenrod – Pelt lichen*

Structural Stage: 3, 6

Site Modifiers mapped: g, s, v, w

Status: REGIONAL

This ecosystem typically occurs on moderate to steep slopes with a west, north, or east aspect. It is not present on any south or southwest aspects and on north aspects it occurs only on moderate slopes. It frequently occurs on less consolidated material and coarse-textured glaciofluvial terraces, where gullying is common. SMR is submesic to mesic.

These sites are widely distributed and are quite variable, ranging from very small gullies to extensive areas of open forest. The climax vegetation is open to moderately closed (7-40% cover) Douglas-fir forests. The understory includes scattered Rocky Mountain juniper and bluebunch wheatgrass together with a variety of forbs including spike-like goldenrod, pussytoes, nodding onion and pasture sage. This unit can be distinguished from other forested units by the presence of bluebunch wheatgrass and the lack of red-stemmed feathermoss, step moss and pinegrass. Lichen and moss cover is generally lower than on /01 and north aspect grasslands. It usually consists of *Cladonia* spp. (including *C. carisa*, *C. pyxidata*, *C. symphicarpa* and others) and *Peltigera* spp. (including *P. ponojensis*, *P. canina* and others).

DJ *03 Fd - Rocky mountain juniper -Bluebunch wheatgrass*

Structural Stage: 5, 6

Site Modifiers mapped: s, v

Status: REGIONAL

This site series occurs on steep, northwest to northeast facing slopes. Soils are deep and medium textured with Mor humus forms typically of a thickness of 5 to 6cm. Soils may be coarse textured and/or gullied.

These sites are generally steeper than those of the /02 Site Series. This site series is characterized by moderate to high cover of Douglas fir (20-80%), with occasional Rocky Mountain juniper and snowberry. Scattered bluebunch wheatgrass, forbs and a well developed moss layer are usually present. This unit can be distinguished from site series /02 by the presence of step moss and red-stemmed feather moss and from site series /04 by the lack of pinegrass and presence of step moss. The abundance of bluebunch wheatgrass varies with Douglas fir canopy closure; sites with open forest canopies have more bluebunch wheatgrass. Slender wheatgrass replaces bluebunch wheatgrass on some mesic sites.

DM 05 Trembling Aspen – Douglas maple

Structural Stage: 5

Site Modifiers mapped: none

Status: REGIONAL

This site series typically occurs on mid to lower slopes in deep, cool gullies with permanent or intermittent streams. It is uncommon but occurs throughout the range of the BGxw2. It is found on deep, medium-textured soils and has a subhygric soil moisture regime.

These moist draws and gullies are characterized by a dense shrub layer of Douglas maple, snowberry, wood rose and saskatoon, as well as a variable tree overstorey of aspen and/or Douglas-fir. The understorey is patchy with showy aster, a variety of other herbs, some moss and scattered pelt lichens present.

DP 04 Fd Pinegrass – Red stemmed feathermoss

Structural Stage: 6

Site Modifiers mapped: none

Status: REGIONAL

This ecosystem is generally limited to elevations greater than 850m. It is typically located on gentle to moderate slopes that have cool aspects. Intermittent seepage is common in these primarily lower slope positions where this site series is found. Soils are deep and fine textured. This ecosystem can also occur on fans, terraces, and in gullied terrain. It can also occur occasionally on warm aspects near the IDFxM transition and in the cool canyons. The SMR is generally subhygric.

These ecosystems often occur downslope of Site Series /03. Douglas fir canopy usually covers about 30% of the surface. The undergrowth consist of scattered shrubs (including snowberry and rose) and a nearly continuous cover of pinegrass and mosses, particularly red-stemmed feathermoss. Some sites have Kentucky bluegrass, slender wheatgrass and a scattering of pelt lichens. This unit can be distinguished form other forested units by the presence of pinegrass.

BG xw 2 – Grasslands

PL 38 Short-awned porcupinegrass – Lemonweed

Structural Stage: 2

Site Modifiers mapped: none
 Status: REGIONAL

This site series is generally very small (often <100 m²) but is common and widely distributed in the BGxw2. Typically it occurs on lower slopes in very shallow depressions and swales that receive soil moisture from snow accumulation on surrounding hillslopes. Snowpacks often remain later in these shallow depressions than on surrounding areas. Soils are deep and derived from medium-textured till material with aeolian veneers. As a result of the aeolian veneers fine-textured soils may occur.

They typically occur as inclusions within a matrix of the /01 site series. A dense cover of short-awned porcupinegrass (50-85%) dominates the vegetation. A thick litter layer is usually present. Vegetation also includes occasional bluebunch wheatgrass and junegrass, as well as a scattering of several forbs (including lemonweed, salsify, yarrow, pussytoes and sagebrush mariposa lily). Lichen cover is generally low (1-30%), due to the thick, matted grass litter covering the ground. Dominant lichen species include *Cladonia* spp. (*C. cariosa*, *C. pyxidata*, *C. chlorophaea*, *C. gracilis*, and *C. macrophylla*) and occasionally a few pelt lichen clumps. The area of non-vegetated soil is usually less than 5%. This unit can be distinguished from /39 by the absence of spreading needlegrass, kinnikinnick, death camas, Drummond's campion and by the presence of pasture sedge. It can be distinguished from /39A by the absence or low cover of Kentucky bluegrass.

PW *34 Pasture sage - Bluebunch wheatgrass*

Structural Stage: 2

Site Modifiers mapped: k, v

Status: RED?

This ecosystem occurs on moderately to steeply sloping warm aspects. Due to the steep nature of these slopes, soil surfaces are eroding and unstable, resulting in exposed, unvegetated surficial material with a discontinuous humus cover. Coarse-textured soils are common. The SMR is xeric while the SNR is submesotrophic to oligotrophic.

The vegetation is typically dominated by widely spaced clumps of bluebunch wheatgrass and big sagebrush. The abundance and composition of the vegetation varies depending on the degree of active surface erosion. In general the diversity of species is lower than in the BGxw2/01 Site Series. The species in common with the /01, but with generally lower covers (0.2-2%), include pasture sagebrush, pussytoes, brittle prickly-pear cactus, junegrass, large-fruited desert-parsley and needle-and-thread grass. Total cover of mosses, lichens, and algae varies from 15% to 90% and is dominated by early seral, crust and scale lichen species (*Collema* sp., *Caloplaca* sp., *Psora* spp., *Psora cerebriformis* and others) as well as low covers of *Cladonia cariosa* and *C. pyxidata*. *Peltigera* spp. and other *Cladonia* spp. of climax zonal sites are rare in the /34 unit. Lichens are often more abundant and diverse under the canopy of big sagebrush. Most other lichens that occur sporadically on these sites are more typical of the BGxh3 – *Aspicilia reptans*, *Buellia elegans*, and *Ochrolechia upsaliensis*.

WN *01A Bluebunch wheatgrass – Needle-and-thread grass*

Structural Stage: 2

Site Modifiers mapped: s, w

Status: RED?

This occurs on level and gently rolling sites above 880m but steep on east and northwest facing slopes. Surficial materials consist of aeolian veneers over till. Typically soils are deep and medium-textured. The SMR is mesic.

This unit differs from the typical /01 unit by more vigorous bluebunch wheatgrass, sparse or absent needle-and-thread grass, brittle prickly-pear cactus and western blue flax and the greater abundance of forbs. It is transitional to the IDFXm grasslands. Common forbs of the 01A include, in addition to those common in the /01, pussytoes, northern wormwood, nodding onion, yarrow, spike-like goldenrod, trailing fleabane, yellow owl-clover, round-leaved alumroot, sagebrush mariposa lily, woolly groundsel, death camas and lance-leaved stonecrop. The lichen community is often better developed (40-70% cover) and has a greater diversity of pelt lichens (especially *Peltigera rufescens*, *Peltigera didactyla* and *Peltigera ponojensis*) than does the /01. The area of exposed, non-vegetated mineral soil is generally less than 15%.

WO *37 Bluebunch wheatgrass - Nodding onion*

Structural Stage: 2

Site Modifiers mapped: s

Status: RED?

These sites are common and widely distributed in the BGxw2, occurring on moderate to steeply sloping north and northeast aspects. In limited cool canyons this site series may be located on gentler and more westerly slopes. These sites are often gullied or hummocky and can occur on glaciofluvial material; however, surficial materials typically consist of aeolian veneers over till blankets. Exposed mineral soil typically occupies less than 10% of the site.

This unit often occurs upslope of forested Douglas fir site series and adjacent to /01. Bluebunch wheatgrass is the dominant species (40-55% cover) but a variety of other herbaceous species are also present. In contrast to /01 site series, these sites typically lack needle-and-thread grass. The lichen community is well developed in the areas between grass bunches (60-75% cover) and is usually dominated by *Cladonia pyxidata*, *C. symphicarpa* and *C. cariosa*., *Psora* spp. and *Collema* sp. are sometimes present with less than 1% cover on late seral to climax sites.

Engelmann Spruce-Subalpine Fir Biogeoclimatic Zone (ESSF)

ESSF_{xv2} (very dry very cold subzone, Big Creek variant)

ESSF xv 2 – Forested Ecosystem Units

Insufficient data is available to present this variant as a Site Series classification so ESSF_{xv1} Site Series have been used.

AC 01 Bl - Arnica – Cladonia

Structural Stage: 7

Site Modifiers mapped: h

This site series is predominant in the ESSF_{xv}. It is located typically in mid slope positions on gently to moderate slopes. Soils are typically loamy or sandy and often gravelly. The SMR mesic to submesic and the SNR are submesotrophic to permestrophic.

Subalpine fir and Engelmann spruce are climax species but, due to past wildfires and slow rates of succession in this cold, dry climate, most natural mature stands are dominated by lodgepole pine. The undergrowth vegetation has a sparse shrub layer with common juniper almost always present. There is a low to moderate cover of low forbs, principally heart-leaved arnica, dwarf blueberry, diverse-leaved cinquefoil and arctic lupine. Several other herbaceous species are present but have very low cover values. The moss/lichen layer is relatively sparse and consists of primarily Dicranum and Brachythecium mosses and Cladonia and pelt lichens.

FR 06 Bl - Rhododendron – Crowberry

Structural Stages: 7

Site Modifiers mapped: none

This ecosystem occurs on mid to upper slopes of gentle to steep northwest to east facing slopes. However, it is also located on coarse-textured lower slopes. Soil textures are typically gravelly loamy and sandy. The SMR is submesic to mesic while the SNR is submesotrophic to mesotrophic.

The mature forest canopy is dominated by lodgepole pine or subalpine fir trees. Whitebark pine and spruce are also usually present. The undergrowth vegetation is distinguished by abundant white-flowered rhododendron and occasionally black huckleberry. Grouseberry, crowberry, and heart-leaved arnica dominate the herb layer.

FT 09 Bl - Twinberry – Hellebore

Structural Stages: 5, 6, 7

Site Modifiers mapped: none

This site series is located in toe slope positions and small depressions with near-surface water table in the form of persistent seepage. Soil textures are loamy and silty. The SMR is hygric to subhygric while the SNR ranges from permestrophic to eutrophic.

In contrast to the /08 site series, sites occur primarily on valley side slopes, which are better drained of cold air than valley bottoms. The mature forest canopy is dominated by

Engelmann spruce and subalpine fir and the undergrowth is distinguished by a vigorous herbaceous layer containing several species indicative of wet, rich sites. These include clasping twistedstalk, fringed grass-of-Parnassus, cow-parsnip, and abundant Brachythecium and leafy mosses. The vegetation has fewer similarities to bog wetlands than do /08 sites.

JG *04 BIPa - Juniper – Grouseberry*

Structural Stages: 6, 7

Site Modifiers mapped: j, r

This ecosystem occurs on steep upper slope positions with south and west aspects. Soils typically have a high coarse fragment content, represented as a gravelly and rubbly loam. The SMR is subxeric to submesic and the SNR is submesotrophic to permesotrophic.

The mature forest canopy on these dry ecosystems consists of relatively open-grown whitebark pine and lodgepole pine. Both pines, as well as subalpine fir, are common in the understory. The undergrowth vegetation has abundant common juniper and, occasionally, soopolallie. Herbaceous plants typically have a sparse cover consisting of a small number of species. Heart-leaved arnica and grouseberry are usually present.

WJ *02 BIPa - Juniper – Cladonia*

Structural Stages Mapped: 3, 6, 7

Site Modifiers mapped: none

Although widespread this site series is uncommon. It is located on dry crests and some upper slopes with shallow soils typically less than 50cm. Soil textures are loamy to sandy, usually gravelly or rubbly. The SMR is very xeric to subxeric while the SNR is oligotrophic to permesotrophic.

The mature forest canopy is moderately open and most often dominated by lodgepole pine. Equal amounts of whitebark pine are sometimes present. Subalpine fir is common in the understory. The undergrowth vegetation is sparse and typically includes scattered common juniper, a few low herbs, and abundant lichens.

ESSF xv 2 – Shrub and Herb Dominated Units

These ecosystems are derived from fieldwork carried out in the SBPSxc

BF *W12 Beaked sedge fen*
 Structural Stage: 2
 Site Modifiers mapped: none

See description in SBPSxc

KG *Kinnikinick – Grass*
 Structural Stage: 2
 Site Modifiers: c, r, w

See description in SBPSxc

SW *Rocky Mountain cow-lily - Water smartweed (from SBPSxc subzone)*
 Structural Stage: 2
 Site Modifiers mapped: none

See description in SBPSxc

WM *W5 (and W4) Grey - leaved willow – Moss shrub carr*
 Structural Stage: 3a
 Site Modifiers mapped: none

See description in SBPSxc

Interior Douglas fir Biogeoclimatic Zone (IDF)

IDFdk3 (dry cool subzone, Fraser variant)

IDF dk 3 – Forested

AR *00 Aspen – Rose*
 Structural Stage: 5
 Site Modifiers mapped: none
 Status: REGIONAL

This site series is similar to the AR in the IDFXm but site features are different. This unit is for “permanent” aspen stands.

DJ *03 Fd - Juniper – Peltigera*
 Structural Stages: 5, 6, 7
 Site Modifiers mapped: j
 Status: BLUE

This ecosystem is uncommon throughout the IDFdk3 but is typically small and widely distributed. Occurring on crests to upper slope positions, soils are typically very shallow to shallow. The SMR is xeric with the SNR ranging from mesotrophic to permesotrophic.

Small Douglas fir and lodgepole pine typically dominate the canopy, which is open or closed depending on the area of exposed bedrock. The undergrowth is sparse and dominated by common juniper, dryland forbs and grasses, and lichens. Pinegrass cover is sparse.

DM *05 Fd - Feathermoss - Step moss*

Structural Stages: 5, 6, 7

Site Modifiers mapped: none

Status: BLUE

This site series is uncommon in occurrence but widespread in the IDFdk3. It occurs on moderate to very steep north-facing slopes. Parent materials, if present, include aeolian veneer over till and colluvial veneer over rock. Soil textures varies from sand to loam. The SMR ranges from subxeric to submesic while the SNR oligotrophic to mesotrophic.

The forest canopy is relatively closed, and dominated by Douglas fir and a few lodgepole pine. Douglas fir regeneration is often dense. The undergrowth is dominated by mosses (primarily step moss and red-stemmed feathermoss) and typically has few vascular plants other than scattered pinegrass, showy aster, and twinflower. Shrubs are scarce. The uniform dominance of the undergrowth by mosses distinguishes this site series.

DP *06 Fd - Pinegrass – Aster (6)*

Structural Stage: 6

Site Modifiers mapped: none

This ecosystem is common and widespread occurring on moderate to steep warm aspects; however it can also be found on gentle slopes. Gullying is common. Soils are typically deep but this Site Series can also be found on shallow soils. Surficial material textures are typically medium-textured, loamy. The SMR is submesic while the SNR ranges from mesotrophic to permesotrophic.

Multi-sized Douglas fir trees with relatively little lodgepole pine dominate the mature forest canopy. Large Douglas fir trees and snags are common. Douglas fir regeneration typically occurs in dense clumps associated with past disturbance or rotting wood. The undergrowth is dominated by a nearly continuous cover of pinegrass, kinnikinnick, and red-stemmed feathermoss. Abundant kinnikinnick distinguishes these sites from those of the unlogged /01 site series. (Kinnikinnick often increases following logging on /01 sites.)

DW *04 Fd - Bluebunch wheatgrass – Needlegrass*

Structural Stages Mapped: 3, 5, 6, 7

Site Modifier: j

Status: BLUE

This Site Series is uncommon in this BEC zone and variant but widespread. It typically occurs on steep warm aspects. Shallow and very shallow soils are common typically with a loamy texture. The SMR ranges from submesic to subxeric while the SNR is mesotrophic to submesotrophic.

The forest canopy is open and dominated by multi-sized Douglas fir, often with several large snags. Douglas fir regeneration is sparse and occurs primarily in shaded areas but not directly beneath the canopy of large trees. Stunted aspen are common. The undergrowth

includes a moderate cover of common juniper, bluebunch wheatgrass, and spreading needlegrass. Moss cover is sparse. Abundant bluebunch wheatgrass and sparse pinegrass distinguish these from other IDFdk3 sites.

LP 01 FdPl – Pinegrass

Structural Stages: 3, 4, 5, 6, 7

Site Modifier mapped: k, s, w

This Site Series is zonal for the IDFdk3, occupying approximately 85-90% of the landscape. These sites have level to gentle slopes with surficial materials consisting of till or aeolian veneers. Other surficial materials and expressions include till veneer over rock, glaciofluvial or colluvial, or glaciolacustrine deposits. Soils typically have a loamy texture. The SMR is submesic to mesic and the SNR mesotrophic.

This ecosystem is vegetated by Douglas fir (climax) or lodgepole pine (seral) forests. Small trembling aspen stands occur locally. The Douglas fir stands are typically multi-aged and multi-storied with abundant, usually patchy Douglas fir regeneration. Pine stands are typically uniform-aged with little pine regeneration but sparse to dense Douglas fir regeneration. Pinegrass and mosses, especially red-stemmed feathermoss, dominate the undergrowth vegetation of both forests. Only scattered shrubs are present. The proportion of pine stands on the landscape generally increases at higher elevations and in the relatively dry southern portions of the IDFdk3.

SH 09 Sxw - Horsetail -Glow moss

Structural Stages: 4, 5

Site Modifiers mapped: none

This ecosystem occurs in toe slope and depressional positions. Surficial materials are deep, medium-textured and the water table is close to the surface. The SMR is hygric to subhygric while the SNR has a wide range from submesotrophic to eutrophic.

The forest canopy is relatively open and usually dominated by large, widely spaced hybrid white spruce trees with scattered regeneration on raised microsites. The undergrowth has abundant common horsetail or meadow horsetail. Several shrub species common in the /08 unit are also present in this site series. Other wet-site species that are more abundant in this than other site series include nodding wood-reed, palmate coltsfoot, and soft-leaved sedge. Some sites in this series are forested wetlands.

SR 07 SxwFd - Prickly rose – Sedge

Structural Stages: 4, 5, 6, 7

Site Modifiers mapped: none

Status: BLUE

This Site Series occurs in moist lower slope positions on lower gently sloping north-facing positions. Significant seepage is present in these receiving sites early in the spring growing season. Soils are either loamy or sandy. SMR is subhygric while the SNR is mesotrophic.

The forest canopy is typically closed, and dominated by a mixture of hybrid white spruce and Douglas fir. Lodgepole pine and paper birch are also often present. Undergrowth vegetation is dominated by pinegrass, red-stemmed feathermoss, twinflower, and prickly rose, but may

also include scattered moist-site indicators such as black twinberry, red-osier dogwood, and bunchberry. It is distinguished from the zonal site series by the presence of these moist-site species and from wetter sites by the low abundance of these species and wetter-site species such as sarsaparilla, highbush-cranberry, black gooseberry, horsetails, and leafy mosses.

SS 08 *SxwFd - Prickly rose – Sarsaparilla*

Structural Stages: 4, 5, 6, 7

Site Modifiers mapped: none

Status: BLUE

Occurring on moist lower and toe slope positions this ecosystem is typically found down slope of the /07 unit. These sites are moist throughout the growing season due to intermittent seepage inputs following snowmelt and summer precipitation. Soils are deep and medium-textured but fine-textured material does occasionally occur. The SMR is subhygric and the SNR ranges from permesotrophic to eutrophic.

The forest canopy is closed, and dominated by a mixture of hybrid white spruce and Douglas fir, often with scattered lodgepole pine, paper birch, and aspen in the lower canopy. Shrub cover is greater than on drier sites and includes highbush-cranberry, prickly rose, black twinberry, black huckleberry, and soopolallie. Several forb and grass species, including pinegrass, wild sarsaparilla, bunchberry, and twinflower, make up the productive herb layer. Moss cover is nearly continuous.

IDF dk 3 – Grasslands

PP 00 *Short-awned Porcupine grass – Pussytoes*

Structural Stage: 2

Site Modifiers mapped: none

Status: RED?

These sites are typically flat-lying and gently sloping sites with north, northeast, or southeast aspects on rolling eolian veneer over morainal blankets. Due to level, north, or lee aspects snowpacks are more persistent than in some other grassland units, so there is still a mesic moisture regime and mesotrophic nutrient regime.

The late seral vegetation is dominated by a nearly continuous cover of short-awned porcupine grass and umber pussytoes with a thick litter buildup and only scattered forbs and lichens.

WY 00 *Bluebunch wheatgrass – Yarrow*

Structural Stage: 2

Site Modifiers mapped: k, s, w

Status: RED

This ecosystem occurs on level to moderately sloping sites primarily on south and west-facing aspects from mid to upper slope positions. Parent materials are eolian veneers over morainal blankets with deep medium-textured soil. SMR is mesic to submesic and SNR is mesotrophic. In the study area, shallow soils are occasionally found.

Late seral and climax vegetation is dominated by bluebunch wheatgrass with a very diverse grass, forb and a well developed cryptogam community. Grazing reduces lichen cover and increases weedy forbs such as salsify, Kentucky bluegrass, wooly cinquefoil, trailing daisy, cut-leaved daisy, and northern wormwood.

IDF dk 3 – Wetlands

AF W2 Alkaligrass - Foxtail barley meadow

Structural Stage: 2

Site Modifiers mapped: none

Status: REGIONAL

Standing water is seldom in these ecosystems, but is present during spring flooding with the soils drying by mid-growing season. This site series occurs on mineral soils that are strongly carbonated but do not possess a solonchic horizon. Soil texture is either a silty clay or silty clay loam. The SMR is subhygric and the SNR is permesotrophic.

This meadow association has very few species and a low total plant cover, usually less than 50%. Alkali saltgrass is usually present. High salinity levels severely restrict plant growth. Characteristic vegetation include alkali saltgrass, Nuttall's alkaligrass, seablite and Nevada bulrush.

AG W12 Arrowgrass Marsh

Structural Stage: 2

Site Modifiers mapped: none

Status: BLUE

These ecosystems are most often seasonally inundated although standing water may remain until late August. Soil organic accumulations are mostly 25-50 cm thick and mineral-rich. Surface materials are usually strongly carbonated. Mineral soil texture associated with these sites is either silty loam or silty clay loam. The SMR is hydric while the SNR is permesotrophic.

These ecosystems usually occur in small patches. Very low species diversity, often with just the single species, seaside arrowgrass, being present. Aquatics such as greater bladderwort and mares-tail may occur.

AS W8 Awned sedge-fen marsh

Structural Stage: 2

Site Modifiers mapped: none

Status: REGIONAL

This marsh is seasonally or permanently inundated. Soils are variable with organic layers 0 to over 100 cm but rooting is concentrated in the surface organic layer. SNR is permesotrophic to eutrophic, SMR is hygric to subhygric.

Vegetation is dominated by awned sedge with sloughgrass, water buttercup, beaked sedge, slim stem reedgrass, and meadow foxtail associates.

BU W14 Great bulrush marsh

Structural Stage: 2

Site Modifiers mapped: none
Status: BLUE

These marshes are usually found surrounding open water and are most often permanently inundated. The soil is a mixture of fine-textured mineral sediments and organic material. Surfaces are often carbonated. Organic accumulations are 0 to over 25 cm thick. Shells are frequently present in the soil. The SMR is hydric and the SNR is eutrophic.

Typically this association is a pure stand of great bulrush. Aquatics, notably greater bladderwort, are often present. The bulrush marsh usually occupies more than 20% of a wetland and occurs in bands surrounding open water. It is frequently bordered by a narrow band of sedge fen in the transition to a drier meadow.

BW *W9 Beaked sedge – Water sedge fen*
Structural Stage: 2
Site Modifiers mapped: none
Status: REGIONAL

These ecosystems are inundated (up to 40 cm) in the early growing season, but standing water most often disappears by mid-August. Organic accumulations are usually greater than 50 cm over existing mineral soils. Organic materials are frequently carbonated. The SMR ranges from subhydric to hydric and the SNR is eutrophic.

These fens are frequently managed for hay. A continuous cover of beaked sedge and water sedge characterizes this ecosystem. Stands are usually a mixture in which either species may be the dominant or, less frequently, one species occurs in pure stands. Northern mannagrass may be present in wetter microsites. Aquatic species and water smartweed may also be present.

CT *W13 Cattail marsh*
Structural Stage: 2
Site Modifiers mapped: none
Status: REGIONAL

These marsh ecosystems usually occur in very small patches at the edge of small streams, ponds, or lakes. Most are deep marshes that are permanently inundated although very small seasonal marshes also occur. The surficial material is an organic veneer over a fluvial plain. The SMR is hydric and the SNR is eutrophic.

Cattail is the dominant emergent vegetation. Aquatics are usually present. Other vegetation may be rooted in floating mat of moss. A cattail marsh may cover 95% of a wetland with a narrow border of shrubs, or there may only be a few clumps of cattail within an area of shallow open water.

MS *W5 Maccall's willow – Beaked sedge fen*
Structural Stage: 3a
Site Modifiers mapped: none
Status: REGIONAL

Standing water is shallow and usually absent by mid-season. Soils are usually saturated within the rooting zone. Organic accumulations are usually greater than 1m. Soils are not carbonated. The SMR is hygric to subhydic.

This variable association is characterized by a high cover of shrubs (>60%) with beaked sedge and water sedge in wet depressions. Grasses are commonly present. Most other herbaceous growth is found on the hummocks associated with the shrubs. A variety of mosses occur, including *Sphagnum* spp. in some areas. This shrub association may border an area of Beaked sedge – Water sedge Fen (a), or it may form the central part of a wetland with a drier shrub-carr border (b).

TS *W6 Tall willow – Sartwell's sedge swamp*

Structural Stage: 3b

Site Modifiers mapped: none

Status: BLUE

These ecosystems are associated with streams and rivers and are enriched by surface and subsurface water flow, bringing nutrients and sediments. Small channels and pools are often evident. Soils are usually saturated near the surface throughout the growing season. Organic accumulations range from absent to over 150cm deep. The SMR is hygric while the SNR is permestrophic.

This species rich association (hybrid white spruce, willow, sedge, wintergreen, bedstraw, aster, mannagrass and mosses) is dominated by tall willows. In the herb layer Sartwell's sedge as well as beaked sedge and water sedge are usually present. Mosses are always present. This swamp association may cover 100% of a channeled form of wetland, or it may be interspersed with a Beaked sedge – Water sedge Fen Association and/or a Maccall's willow – Beaked sedge Fen Association.

IDFdk4 (dry cool subzone, Chilcotin variant)

IDF dk 4 – Forested

AR 00 Trembling Aspen – Rose

Structural Stage: 5

Site Modifiers mapped: none

Status: REGIONAL

These deciduous stands occur on gentle slopes in moist receiving depressions. These are sometimes adjacent to wetlands or along open gullies a glaciofluvial channels. Parent materials are typically glaciolacustrine and silty soils are most usual. SMR is subhygric and the SNR is permesotrophic.

Trembling aspen forms pure stands with a well developed shrub layer of prairie rose and snowberry. The herb layer may include western meadowrue, northern bedstraw, American vetch, pinegrass, showy aster and blue wildrye.

DJ 03 Fd - Juniper – Saskatoon

Structural Stage: 6

Site Modifiers mapped: none

Status: BLUE

This ecosystem is typically found on moderate to steep south or west facing slopes. Located somewhere between the midslope and the crest the main source of water is precipitation. Soils are sandy often with a gravel component. SMR ranges from xeric to subxeric while the SNR is oligotrophic to submesotrophic.

The forest canopy is typically very open, patchy, and dominated by multi-sized Douglas fir. Large standing dead trees are often present. Tree regeneration occurs primarily in the shade of, but not in the rainshadow directly beneath, canopy trees. The undergrowth is dominated by saskatoon, a variety of dry-land herbaceous plants, and lichens. Moss cover is sparse, and

DM 07 Fd - Feathermoss - Step moss

Structural Stage: 4, 5, 6, 7

Site Modifiers mapped: k

Status: BLUE

This Site Series occurs on steep northwest to east facing slopes. Soils are medium-textured and deep, however on some slopes they may be shallow. Snow patches often persist in these ecosystems longer than on other sites. The SMR is submesic and the SNR is submesotrophic to mesotrophic.

The canopy is relatively closed, often has a moderately dense subcanopy layer, and is dominated by Douglas fir. The undergrowth is dominated by a carpet of feather mosses with relatively few vascular plants.

DW 05 Fd - Bluebunch wheatgrass - Pinegrass

Structural Stage Mapped: 4, 5, 6, 7

Site Modifiers mapped: none
Status: BLUE

This ecosystem occurs on moderate south to southwest-facing slopes and some steep west-facing slopes. Soils are medium-textured and deep but at times are shallower than average. Specifically, soil texture is loamy. The SMR is submesic to subxeric while the SNR is mesotrophic to submesotrophic.

Since these sites are less hot and dry than the /03 or /04 units, the forest canopy is nearly continuous. Douglas fir dominates the forest canopy and tree regeneration layers, although tree regeneration is often sparse. The undergrowth is dominated by bluebunch wheatgrass, pinegrass, and kinnikinnick.

JP 02 Fd - Juniper - Peltigera
Structural Stage: 5, 6
Site Modifier mapped: w
Status: BLUE

Occurring typically on crests and upper slope positions this ecosystem occurs on shallow to very shallow soils over bedrock. Soils are loamy and often gravelly. It can be found in either cool or warm aspects. The SMR is xeric and the SNR is permestrophic to oligotrophic.

The forest canopy is patchy, with gaps where bedrock is nearest the surface, and dominated by multi-sized Douglas fir. A few small trembling aspen stems are often present. The undergrowth vegetation is dominated by common juniper, Rocky Mountain juniper, kinnikinnick, and lichens.

LC 06 Pl - Kinnikinnick – Cladonia
Structural Stage: 3a, 3b, 4, 5, 6, 7
Site Modifier mapped: k, w

Occurring most commonly near the lower elevation limits of the IDFdk4, this ecosystem typically occurs on level to gentle slopes consisting of deep coarse-textured soils on sandy gravelly fluvial terraces. The soil texture is sand. The SMR is submesic while the SNR is submesotrophic.

The forest canopy is dominated by lodgepole pine and the undergrowth by kinnikinnick and lichens. Douglas fir is uncommon in the forest canopy but is often scattered in the regeneration layer. Lodgepole pine is the most abundant species of tree regeneration.

LP 01 FdPl - Pinegrass – Feathermoss
Structural Stage: 3, 4, 5, 6, 7
Site Modifiers mapped: none

These are typically mesic forests on level to gentle slopes. The surficial material is usually a till blanket but coarse-textured glaciofluvial and fine-textured glaciolacustrine deposits may also be present. Nevertheless, the typical texture is sandy. The SMR is submesic to mesic while the SNR is submesotrophic to mesotrophic.

This ecosystem dominates the IDFdk4 landscape and is vegetated by Douglas fir (climax) or lodgepole pine (seral) forests. Small trembling aspen stands occur locally. The Douglas fir stands are typically multi-aged with abundant, usually patchy Douglas fir regeneration. Pine stands are typically uniform-aged with little pine regeneration but variable amounts of Douglas fir regeneration. The undergrowth vegetation of both forests is dominated by pinegrass, mosses, lichens, and kinnikinnick. Only scattered shrubs are present.

SF *09 Sxw - Feathermoss – Brachythecium*

Structural Stage: 3, 4, 5, 6, 7

Site Modifiers mapped: none

Status: BLUE

This Site Series occurs on moist lower and toe slope seepage sites often bordering stream channels. Soils are deep and often coarse-textured, but medium textured loamy soils also exist. The SMR is subhygric and the SNR is permesotrophic.

The forest canopy is moderately closed, and dominated by hybrid white spruce, with scattered Douglas fir, lodgepole pine, and aspen. The undergrowth is diverse and distinguished by abundant pinegrass, palmate coltsfoot, and star-flowered false Solomon's seal.

SH *10 Sxw - Horsetail - Glow moss*

Structural Stage: 4, 5, 6, 7

Site Modifiers mapped: none

This ecosystem occurs in wet toe slope positions and depressions where a water table is close to the surface. This situation often occurs adjacent to wetlands. Soils are deep and medium-textured, typically loamy, silty, or organic. The SMR is hygric to subhygric while the SNR ranges from submesotrophic to eutrophic.

Many of these sites are forested wetlands. The forest canopy is moderately closed to open, and dominated by hybrid white spruce. The undergrowth contains a variety of shrubs and wet-site herbaceous species. These sites are distinguished by abundant common horsetail.

SS *08 Sxw - Scrub birch – Feathermoss*

Structural Stage: 3, 4, 5, 6

Site Modifiers mapped: none

Typically occurring on lower slope and toe positions, this ecosystem is situated along the edge of cold air accumulation basins. Usually adjacent to a wetland, intermittent or low-volume seepage is common in these sites. Surface soils are often moist, but a water table is at a depth greater than 50cm. The SMR is subhygric and the SNR ranges from submesotrophic to mesotrophic.

The canopy is moderately open and dominated by hybrid white spruce and lodgepole pine. The undergrowth is distinguished by the presence of scrub birch and willows, primarily grey-leaved willow.

IDF dk 4 – Grasslands

DT Dandelion -Timber oat-grass (from the SBPSxc subzone)

Structural Stage: 2

Site Modifiers mapped: none

See description in SBPSxc section.

GL Grass – Larged-leaved avens (from SBPSxc)

Structural Stage: 2

Site Modifiers mapped: none

Status: REGIONAL

See description in SBPSxc section.

NR Spreading needlegrass – Baltic rush: Kentucky bluegrass seral assoc.

Structural Stage: 2

Site Modifiers mapped: none

Status: RED?

This ecosystem typically occurs in moist depressions, on toe slopes, and on moisture receiving sites adjacent to wet meadows or wetlands. Parent materials are glaciofluvial and lacustrine deposits over till. The SMR is subhygric and the SNR is permesotrophic.

Extensive grazing has promoted the seral association (NR:bb) dominated by cultivated and weedy plant species. In the grass-forb seral association dominant plant species include Kentucky bluegrass and smooth brome, while in the climax stage, spreading needlegrass and baltic rush dominate. Associates include prairie rose, saskatoon, western snowberry, baltic rush, meadow salsify, slender wheatgrass, sweet-clover and alfalfa in the seral association, while in the climax condition associates are fewer (prairie rose, saskatoon and western snowberry).

WB Bluebunch wheatgrass – Balsamroot

Structural Stage: 2

Site Modifiers mapped: k, r, s, w

Status: REGIONAL

This ecosystem occurs on gently to moderately sloping sites primarily on south and west facing aspects from mid to upper slope positions. Parent materials are aeolian veneers over till blankets. The SMR is mesic to submesic while the SNR is mesotrophic.

Late seral and climax vegetation is dominated by bluebunch wheatgrass with a very diverse grass, forb, and a moderate cryptogram community. Moderate grazing pressure can produce the needle-and-thread grass seral association. Dominant plant species in the climax condition include bluebunch wheatgrass, northern sweet-vetch and *Cladonia cariosa*. At climax, this ecosystem is has a slightly richer herb community than in the IDFXm. Associate species can include arrow-leaved balsamroot, needle-and-thread grass, junegrass, pasture sage, spike-like goldenrod, showy daisy, meadow salsify, field chickweed, *Collema* spp. and rusty steppe moss. Grass-forb seral associations, due to grazing pressures, contain other dominant species such as needle-and-thread grass, Kentucky bluegrass, junegrass, pussytoes, woolly cinquefoil and trailing fleabane.

IDF dk 4 – Wetlands

AF W2 Nuttall's alkaligrass – Foxtail barley wet meadow

Structural Stage: 2

Site Modifiers mapped: k, w

Status: REGIONAL

See description in above IDFdk3 section.

Dominant plant species include Nuttall's alkaligrass and foxtail barley, while associate species include Nevada bulrush and northern mannagrass.

BU W14 Great bulrush marsh

Structural Stage: 2

Site Modifiers mapped: none

Status: REGIONAL

See description in above IDFdk3 section.

The dominant plant species is the great bulrush, while plant associates may include greater bladderwort, duckweed and water smartweed.

MS W5 Macall's willow – Beaked sedge fen (from IDFdk3 subzone)

Structural Stage: 3a

Site Modifiers mapped: none

Status: REGIONAL

See description in above IDF dk3 section.

SM Beaked sedge – Water sedge marsh

Structural Stage: 2

Site Modifiers mapped: none

Status: REGIONAL

This ecosystem is inundated in the early growing season, but standing water often disappears by mid-August. Organic accumulations, which are often carbonated, are usually thicker than 50cm over mineral soil. Rich mineral sub-surface layers may be present. The SMR ranges from subhydic to hydric with very poor drainage, while the SNR is permesotrophic to eutrophic.

This marsh is dominated by beaked sedge, water sedge and *Drepanocladus aduncus*. Associated vegetation may include northern mannagrass, buttercups, water-milfoil, bladderwort, duckweed, and water smartweed.

SW Rocky Mountain cow-lilyk - Water smartweed (from SBPSxc subzone)

Structural Stage: 2

Site Modifiers mapped: none

Status: REGIONAL

See the description in SBPSxc section.

TS Tall willow – Sedge swamp

Structural Stage: 3b

Site Modifiers mapped: none

Status: REGIONAL

These swamps are associated with streams and rivers and are enriched by surface and subsurface water flow that brings sediments and nutrients. Small channels and pools are often evident, with soils saturated near the surface throughout the growing season. Organic accumulations range to depths greater than 150 cm. Mineral soil texture is variable. The SMR is hygric to hydric and the SNR is permesotrophic.

Dominant plant species include tea-leaved willow, slimstem reedgrass, beaked sedge and water sedge, while associate species include other willows, Baltic rush, Kentucky bluegrass, glow moss, sickle moss and *Mnium rugicum*. Species of willow and sedges will vary between locations

IDFxm (very dry mild subzone)

IDF xm – Forested

AR *00 Trembling aspen – Prickly rose*

Structural stage: 4, 5

Site Modifiers mapped: none

Status: RED

These ecosystems typically exist on gentle slopes in moist receiving depressions. These are sometimes adjacent to wetlands or along open gullies and glaciofluvial channels. Parent materials are typically medium textured aeolian deposits but adjacent to wetlands there may be lacustrine deposits. Soil texture varies from medium to fine. The SMR is subhygric and the SNR is permesotrophic.

Trembling aspen often forms pure stands but lodgepole pine can also occur. Prickly rose is the main understorey shrub but soopolalie can also occur. The herb layer includes sarsparilla, American vetch, pinegrass and showy aster.

DJ *03 Fd - Juniper – Cladonia*

Structural Stage: 5, 6

Site Modifiers mapped: j, w

Status: RED

This ecosystem is located on gentle slopes with deep coarse-textured soils on gravelly sandy glaciofluvial blankets and fans. The SMR is subxeric to submesic and the SNR is submesotrophic to oligotrophic.

In contrast to other IDFxm site series, lodgepole pine is common and typically dominates the forest canopy. Douglas fir is the principal species of tree regeneration but lodgepole pine stems are usually present below the frequent canopy gaps. The undergrowth is dominated by kinnikinnick, common juniper, and lichens. Grasses are always present but not abundant. These sites are relatively uncommon. Abundant lodgepole pine and kinnikinnick and relatively little grass cover distinguishes mature vegetation of these sites.

DM *05 Fd – Feathermoss - Step moss*

Structural Stage: 5, 6, 7

Site Modifiers mapped: s, v

Status: BLUE

This Site Series occurs on steep slopes with cool aspects. Surficial materials consist of till which is medium-textured and deep with occasional aeolian cappings. The soil matrix texture is typically loamy. This ecosystem can also occur on gentle and/or gullied terrain, and/or very shallow soils in shady locations. These sites have an SMR that is mesic and an SNR that is mesotrophic.

The mature forest canopy is dominated by Douglas fir and moderately closed. Tree regeneration is more dense than in the /02, /03, and /04 site series. The undergrowth is dominated by a carpet of mosses, primarily stepmoss and red-stemmed feather moss, which distinguishes these from other IDFxm sites. Several vascular plant species are typically

present but their cover is low. Principal shrubs are birch-leaved spirea and prickly rose, while common herbaceous species include bluebunch wheatgrass, pinegrass, and showy aster.

DP 01 Fd – Pinegrass – Feathermoss

Structural Stage: 3, 4, 5, 6, 7

Site Modifiers mapped: c, n, s, v, w

This is the most extensive site series of the IDFXm, occupying in the order of 30-40% of the landscape. Sites are typically on level to moderate slopes with deep medium-textured soils. The soil matrix texture is typically loamy. Slopes are predominantly less than 20% but at times are quite variable with gullying, steeper slopes, and a wide range of soil conditions. Surficial material commonly consists of an aeolian veneer over till or simply a till blanket, but occasionally glaciofluvial and glaciolacustrine deposits are present. This is a zonal ecosystem with a mesic SMR and a mesotrophic SNR.

Douglas fir dominates the forest canopy and tree regeneration layers of nearly all stands. Small trembling aspen stands occur occasionally within the Douglas fir forest matrix and at the transition between these forests and the many grasslands that occur within the IDFXm. The Douglas fir stands have a moderately closed canopy and are single- to multi-storied, depending in part on the history of wildfires that have destroyed small but not larger stems. Tree regeneration is generally less dense than in the IDFDk. The undergrowth contains a sparse to moderate cover of shrubs, several grass species (some are also common in the open grasslands), and several low-growing, dry-land forb species. Moss cover is typically patchy. Most sites in this series are included in the /01a Typic Phase.

DR 06 Fd – Ricegrass – Feathermoss

Structural Stage: 5, 7

Site Modifiers mapped: none

Status: BLUE

This Site Series is located in mesic to moist depressions and at the base of short slopes. Surficial materials are generally lacustrine or a glaciofluvial veneer over till. Soils may be coarse or fine-textured, but the matrix texture is mostly loamy. Sites can be gullied and/or hummocky. The SMR is mesic to subhygric and the SNR is mesotrophic to permesotrophic.

The forest canopy is moderately closed and, as a result, the density of stems in tree regeneration layers is usually less than on zonal sites. Prickly rose, rough-leaved ricegrass, twinflower, and pinegrass typically dominate the undergrowth. Mosses cover most of the soil surface.

DS 04 Fd – Bluebunch wheatgrass - Pasture sage

Structural Stages: 5, 6

Site Modifiers mapped: j, k, s, v, z

Status: BLUE

This ecosystem occurs on moderate to steep, south and west facing slopes. Soils are usually medium-textured, loamy, and deep but may be sandy or gravelly and shallow. As a result of a low percentage of vegetation cover gullying is common. In some hot dry

situations, this site series may rarely occur on gentle, cooler neutral aspect, terraced, and steep slopes. The SMR is subxeric and the SNR is submesotrophic.

These are relatively hot, very dry sites, and they are common. Tree cover is patchy, consisting of multi-sized Douglas fir and occasional trembling aspen. Tree regeneration is sparse and primarily in the partial shade of larger trees. The undergrowth is dominated by shrubs, including Rocky Mountain juniper and saskatoon, and bluebunch wheatgrass. Shrub and grass cover is greater than in the /02 site series. The forest floor is dry and discontinuous and much of the surface is exposed mineral soil.

DW *02 Fd – Bluebunch wheatgrass – Penstemon*

Structural Stages: 2, 4, 5, 6

Site Modifiers mapped: j, s, v

Status: BLUE

Located on typically moderate to steep warm aspects and crests, soils associated with this type are shallow and over bedrock. Slopes range from southeast to westerly aspect. Sandy soils with gullying are common, as are very shallow soils. Soil matrix textures are typically loamy. The SMR ranges from xeric to subxeric while the SNR ranges from oligotrophic to permesotrophic.

These are very dry sites with slow tree growth. The forest canopy is characterized by patches or clumps of multi-sized Douglas fir stems. Open shrub- or grass-dominated areas occur between the clumps. Tree regeneration is typically sparse and occurs primarily in the shade (but not in the “rainshadow” directly beneath the canopy) of larger trees. The undergrowth is relatively sparse and dominated by shrubs and bluebunch wheatgrass.

RS *07 Fd - Prickly rose – Sarsaparilla*

Structural Stages: 4, 6, 7

Site Modifiers mapped: k

Status: BLUE

Typical sites for this ecosystem include lower and toe slope positions at the base of north and east facing slopes. Intermittent seepage is evident. Surficial materials consist of till or, glaciofluvial or lacustrine veneers over till. Gullying may be present along with steeper slopes. The SMR is subhygric and the SNR ranges from mesotrophic to eutrophic.

The Douglas fir dominated forest canopy is moderately closed and often contains paper birch. The sparse to moderately dense tree regeneration is primarily Douglas fir, often with some paper birch. A moderate density of shrubs and several moist-site forbs characterizes the undergrowth. The abundance of Douglas maple, northern gooseberry, violets, and wild sarsaparilla distinguishes these sites from the /06 site series.

SH *09 Sxw – Horsetail*

Structural Stages: 4, 5, 6

Site Modifiers mapped: none

Typical sites include wet toe slope positions and depressions. Free water is usually present within the first 50cm from the ground surface during the growing season. Soils are typically deep, fine-textured, and poorly drained. Often located on active floodplains, layers of medium and coarse-textured surficial material may exist. They occur at the toe of slopes and

in depressions where a water table is near the surface. These sites often occur at the edge of non-forested wetlands and on low terraces of larger streams. The SMR is hygric to subhydryc while the SNR is submesotrophic to eutrophic.

The forest canopy is dominated by hybrid white spruce and is often patchy. The undergrowth is shrubby and contains several moist-to wet-site herbaceous species such as common horsetail, common mitrewort, and trailing raspberry. Abundant horsetail distinguishes the vegetation of these sites.

SS *08 Sxw – Snowberry - Prickly Rose*

Structural Stage: 4, 5, 6, 7

Site Modifiers mapped: none

Status: RED

Occurring on moist to wet, lower and toe slope positions this ecosystem receives seepage water during most of the growing season. They are often associated with intermittent or permanent streams. Soils are typically deep and medium-textured, but may be coarse. Gullyng is frequent. The SMR is subhydryc to hygric and the SNR ranges from submesotrophic to eutrophic.

The forest canopy is moderately closed and dominated by hybrid white spruce. The undergrowth includes a moderate cover of shrubs, including common snowberry and black twinberry, and several moist- to wet-site forbs such as twinflower, star-flowered false Solomon's-seal, and sweet-scented bedstraw. The moss layer is dominated by red-stemmed feather moss and step moss but, in contrast to drier sites, leafy mosses are also present.

IDF xm – Grasslands

NG 37 Spreading Needlegrass - Sticky purple geranium

Structural Stage: 2

Site Modifiers mapped: none

Status: RED?

This site series occurs in shallow depressions and swales within a matrix of drier grassland sites. Occasionally this type occurs in gullied terrain. Soils are deep and often develop on medium-textured aeolian deposits. Other surficial materials include glaciofluvial deposits, which may be coarse-textured, and glaciolacustrine which have fine-textured soils. These are relatively moist in the spring due to late-lying snow and the accumulation of snow meltwater. The SMR is subhygric and the SNR is mesotrophic.

Late seral vegetation of this site series is dominated by a continuous cover of spreading needlegrass with some short-awned porcupinegrass and a wide variety of herbs. The vegetation is distinguished by the presence of sticky purple geranium. Lichens (mostly *Cladonia* spp. with some pelt lichens) and mosses (mostly *Brachythecium* sp.) cover areas between plants below the grass litter.

NP 35 Spreading needlegrass – Pussytoes

Structural Stage: 2

Site Modifiers mapped: s, w

Status: RED?

Occurring on level to gently sloping sites adjacent to forest edges and on the leeward side of hills, this ecosystem experiences a windbreak and shading effect. As a result snow cover is greater. Soils are deep and medium-textured however can occasionally be shallow or very shallow. The SMR is mesic while the SNR is mesotrophic.

It is typically transitional between grasslands of the /33 or /34 site series and a forest. A nearly continuous cover of spreading needlegrass (60-90% cover) dominates vegetation of these sites with abundant grass litter. Herbs are scattered throughout the community and cryptogams form a thick crust between grass clumps beneath the litter (2-75% cover), unless the litter is exceptionally thick. The lichen community is dominated by *Cladonia pyxidata* and *C. cariosa* but a wide variety of other *Cladonia* spp. and *Peltigera* spp. are also present. On some sites, short-awned porcupinegrass is mixed with the spreading needlegrass. The presence of small-flowered penstemon usually distinguishes this site series from the Spreading needlegrass – Cut leaved anemone (/36) site series.

NR 38 Spreading needlegrass - Baltic Rush

Structural Stage: 2

Site Modifiers mapped: none

Status: RED?

This ecosystem occurs in broad depressions and on toe slopes adjacent to wet meadows or wetlands. Surficial materials consist of glaciolacustrine or glaciofluvial deposits. Glaciolacustrine deposits can be medium or fine-textured while glaciofluvial tend to be coarse-textured. The SMR is subhygric and the SNR is permesotrophic.

On south and west aspects, it is typically downslope of the Bluebunch wheatgrass – Pussytoes site series while on other aspects it is often downslope of the Short-awned porcupine grass – Pussytoes Site Series. These sites are vegetated by a combination of Kentucky bluegrass, Baltic rush, spreading needlegrass and a variety of herbs and other grasses. Moisture indicating species such as small-flowered penstemon and graceful cinquefoil are often present. Cover of lichens is variable but ordinarily consists of a few *Cladonia* spp. with some pelt lichens and mosses.

PP *34 Short-awned porcupinegrass – Pussytoes*
 Structural Stage: 2
 Site Modifiers mapped: none
 Status: RED?

This ecosystem is locally extensive on level and very gently sloping terrain with a north or northeast aspect. It is generally found on medium-textured eolian veneers over morainal blankets. Due to its level or north aspects, snowpacks are commonly deeper and longer-lying than in most other grassland areas. SMR is mesic and SNR is mesotrophic.

Climax and late seral vegetation is dominated by a nearly continuous cover of short-awned porcupinegrass and spreading needlegrass with a thick litter buildup and only scattered forbs and lichens. The cryptogam community is diverse (many *Cladonia* spp. and *Peltigera* spp. with some mosses) but is generally not continuous (5-60% cover) because of thick grass litter.

WP *32 Bluebunch wheatgrass - Pasture sage*
 Structural Stage: 2, 3,
 Site Modifiers mapped: z
 Status: RED?

This site series typically occurs on warm aspect, south and southwest facing slopes, that are sufficiently steep to be characterized by active colluvial slopes, sheet erosion, and/or gully development. Soils are deep and coarse-textured. The SMR ranges from subxeric to xeric while the SNR is submesotrophic.

Vegetation can be sparse and widely spaced or fairly continuous with small mineral soil patches. Bluebunch wheatgrass clumps typically dominate the vegetation (15-60% cover). Other herbaceous species are scattered and have a small total cover. Areas between vascular plants are dominated by mineral soil (10-25% of surface) and sometimes rocks (5-40%). Lichen cover is small, *Cladonia* spp. lichens are typically scattered over the surface. This site series is distinguished by its site features and by the absence of yellow owl clover, spike-like goldenrod and cut-leaved anemone.

WY *33 Bluebunch wheatgrass – Yarrow*
 Structural Stage: 2
 Site Modifiers mapped: s
 Status: RED?

This site series dominated the grasslands portion of the IDFXm. It is common on level to moderately sloping sites primarily on south and west facing aspects from mid to upper slope positions. Soils are developed in fine to medium-textured eolian veneers (20-50 cm) over a

morainal blanket. They are predominately Brown or Dark Brown Chernozems. The SMR is mesic to submesic and the SNR is mesotrophic.

Late seral and climax vegetation is dominated by bluebunch wheatgrass with a diverse grass, forb, and a well developed cryptogam community. Grasses and forbs that are common in the spaces between the clumps of bluebunch wheatgrass include yarrow, Rocky Mountain fescue, spreading needlegrass, and pussytoes. Nearly all soil surfaces between vascular plants are covered by well-developed lichen crust, including *Cladonia pyxidata*, *C. cariosa*, *C. symphicarpa*, *D. fimbriata*, *C. macrophylla*, *Peltigera lepidophora*, *P. ponojensis*, *P. rufescens* and *P. canina*, with the occasional mosses.

IDF xm – Wetlands

CM Common Spike-rush marsh

Structural Stage: 2

Site Modifiers mapped: none

Status: REGIONAL

This marsh commonly fringes shallow, open water and is usually inundated most of the year. The mineral soil may be somewhat alkaline. SMR is hydric, SNR is permesotrophic to eutrophic.

The dominant vegetation is common spike-rush and beaked sedge with water smartweed, bluejoint reedgrass, and duckweed associates.

GR Red glasswort – Alkali Bulrush wet meadow

Structural Stage: 2

Site Modifiers mapped: none

Status: REGIONAL

A strongly alkaline wet meadow is seasonally inundated. A carbonate crust is evident on the mineral soil. SNR is hypereutrophic and SMR is hydric. The dominant vegetation is Red glasswort.

SM Beaked sedge – Water sedge marsh

Structural Stage: 2

Site Modifiers mapped: none

Status: REGIONAL

This marsh is inundated (up to 40 cm) early in the growing season but standing water usually disappears by mid-August. Soil organic accumulations may be greater than 50 cm over mineral soil. SMR is subhydic to hydric with very poor drainage and SNR is permesotrophic to eutrophic.

Dominant plant species are beaked sedge and or water sedge, as well as *Drepanocladus aduncus*. Associated species may include northern mannagrass, buttercups, water-milfoil, bladderwort, duckweed, and water smartweed.

TS Tall willow – Sedge swamp

Structural Stage: 3b

Site Modifiers mapped: none

Status: REGIONAL

These swamps are active floodplains associated with streams and rivers. They are enriched by surface and subsurface water flow that brings sediments and nutrients. Small channels and pools are often evident, with soils saturated near the surface throughout the growing season. Organic accumulations are from zero to 150 cm thick. SMR is hygric to hydric and SNR is permesotrophic.

Species of willow and sedges will vary between locations. Plant cover and ecosystem structure is also quite variable depending on frequency and severity of flooding. Dominant plant species include grey-leaved willow, tea-leaved willow, Mackenzie's willow, MacCall's willow, Sartwell's sedge, beaked sedge, water sedge, slimstem reedgrass, glow moss, sickle moss, and *Mnium rugicum*. Associated plant species are hybrid white spruce, pink wintergreen, small bedstraw, boreal aster, and fowl mannagrass.

Montane Spruce Biogeoclimatic Zone (MS)

MSxv (very dry very cold subzone)

MSxv – Forested Ecosystem Units

GK *04 Pl - Grouseberry – Kinnikinnick*

Structural Stages: 4, 7

Site Modifiers mapped: none

This ecosystem occurs on convex crest and upper south aspect slope positions, moderate to steep north aspect slopes, or gentle slopes with sandy soils. Soils have developed on deep till or fluvioglacial material and are Brunisolic Grey Luvisols or Orthic Dystric Brunisols. Texture varies from a silty to sandy loam with a coarse fragment content that varies from 20 to 80%. The SMR is submesic while the SNR ranges from submesotrophic to permesotrophic.

These forests have crown closure of pin-e of less than 30%. Subalpine fir, spruce and pine all occur in the shrub layer. The usual shrubs, common juniper, soopolallie and prickly rose are patchy. Mature forests have quite a diverse herb layer with kinnikinnick being dominant. Twinflower, fireweed, heart-leaved arnica, and bunchberry all occur. Cladonia, freckled lichen and Dicranum dominate the bryophytic layer. Crown closure and species composition does not change significantly in the younger stands.

LG *01 Pl - Grouseberry Feathermoss*

Structural Stages: 3, 4, 5, 6, 7

Site Modifiers mapped: h, k

This Site Series occurs on zonal sites for the MSxv zone and sub-zone on flat to moderately sloping sites. These occur on all aspects of lower to upper till slopes. Soils have a silty to sandy loam texture with varying percentages of coarse fragments, occasionally being classified as gravelly. They are well to moderately well drained and are typically Brunisolic Grey Luvisols. The SMR is mesic and the SNR ranges from submesotrophic to permesotrophic.

Mature forests are dominated by white spruce and only have a minor component of pine and subalpine fir. Crown closure varies from 20 to 40%. Spruce and fir are also in the shrub layer. Common juniper, prickly rose and soopolallie are always present as scattered low shrubs. Black twinberry and willow can also be present. The herb layer in these mature, mesic forests is varied and lush. Twinflower and grouseberry are often abundant while others such as pinegrass, wild strawberry, fireweed, heart-leaved arnica and showy aster are always present. Bunchberry, bracted lousewort, one-sided wintergreen, kinnikinnick, meadowrue, arctic lupine, columbine, northern bedstraw, yarrow and sweet coltsfoot may occur and in some sites are abundant. Bryophytes in these mature forests form a carpet. Red-stemmed feathermoss and Dicranum are most common but glow moss and step moss can be locally abundant. Cladonia spp. and pelt lichens are not as plentiful as mosses.

Younger stands are dominated by pine but the understorey tree species include pine, spruce and subalpine fir. Crown closure may be slightly higher than in the older stands but remains less than 50%. Shrubs are sparse and similar to the mature forests. Herbs are somewhat less lush and varied but the species remain the same. Red-stemmed feathermoss and

Dicranum species dominate the bryophyte layer but freckled lichen, Cladonia species and dog lichen are significant and there is often a very sparse cover of Stereocaulon sp.

LK 03 Pl – Kinnikinnick – Cladonia

Structural Stages: 5, 6, 7

Site Modifiers mapped: c, d, w

This Site Series is limited to areas of shallow soils over bedrock. Slopes range from level to moderately steep with a neutral to warm aspect. They are convex, upper slope and crest positions where drainage is well to rapid. Soils have developed on weathered bedrock or thin till veneers. There is no humus development, the coarse fragment content is greater than 30% and the soil matrix texture is a silty to sandy loam. Regosols, Regosolic Brunisols and Brunisolic Grey Luvisols occur on these sites.

The SMR ranges from xeric to subxeric while the SNR ranges from submesotrophic to permesotrophic.

These very open dry sites usually only have pine in the tree canopy which has crown closure of less than 15%. Common juniper and soopolallie form the scattered low shrub layer and prickly rose can also be very sparse. Kinnikinnick and pine grass have significant cover but other species are less consistent and sparse. These may include lance-leaved stonecrop, twinflower, Rocky Mountain butterweed and timber milk vetch. Crustose lichens dominate the bryophytic layer and mosses are absent. At least 30% of the ground is not vegetated but covered by rocks and mineral soil.

In younger stands isolated trembling aspen occurs while saskatoon and Rocky Mountain juniper are scattered.

LT 05 Pl - Trapper's tea – Crowberry

Structural Stage: 7

Site Modifiers mapped: none

Status: RED

This ecosystem is located on gentle to moderately sloping north and east facing slopes. In the corw study area they also occurred on westerly slopes. Soils are similar to mesic LG sites. The SMR is mesic and the SNR ranges from submesotrophic to permesotrophic.

Pine dominates the open tree canopy in mature sites while spruce is very minor. Trapper's tea is abundant in the shrub layer together with pine regeneration. Other shrubs are scattered and include black twinberry, prickly rose, soopollalie, willow, common juniper and white rhododendron. The herb layer is varied but grouseberry crowberry and twinflower are most abundant. Others include bunchberry, bracted lousewort, fireweed, yarrow, mountain heather, northwestern sedge and showy aster. The bryophyte layer is well developed and is dominated by red-stemmed feathermoss, curly heron's bill moss, Cladonia species, and freckled lichen.

Younger stands have a denser tree canopy of up to 35%. The abundance of trapper's tea is less but the species present are similar, if somewhat reduced in diversity.

SC 06 Sxw - Crowberry - Knight's plume

Structural Stage: 4, 5, 6, 7

Site Modifiers mapped: none

This ecosystem occurs on warm mid, lower, and toe slope positions which are slightly more moist than /01. On gentle slopes this Site Series develops in moist depressions. Surficial materials consist of till with developed Orthic Luvisols and Brunisolic Grey Luvisol soils. Textures vary but are predominantly loamy. The SMR is subhygric with a mesotrophic to eutrophic SNR.

Spruce dominates the mature, open tree canopy. Willow and black twinberry are common in the shrub layer. Subalpine fir is present as regeneration. Herbs reflect the moister conditions of this ecosystem and include sweet coltsfoot, common horsetail, and meadowrue. Other more ubiquitous species include twinflower, bracted lousewort, northern bedstraw, arctic lupine, yarrow, bunchberry, wild strawberry, heart-leaved arnica, fireweed, and pine grass. Mosses such as glow moss, heron's bill moss and red-stemmed feathermoss dominate the bryophyte layer. Pelt lichens and reindeer lichens are scattered.

Younger stands have pine in the tree canopy mixed with spruce. Other species are similar to mature stands.

SG *07 Sxw - Crowberry – Glowmoss*

Structural Stage: 5, 6, 7

Site Modifiers mapped: h, k

These sites are located on lower, toe, and depression slope positions. Persistent seepage is present but a water table does not exist within 50cm of the surface. This Site Series usually occurs along the perimeter of a wet land where drainage is imperfect to poor. Soils are Gleysols with high coarse fragment content in a sandy to silty-clay loam matrix. SMR is subhygric and SNR is mesotrophic.

Mature stands have an open canopy of spruce with scattered pine trees. The understorey regeneration is spruce with isolated sub-alpine fir. Scrub birch and willows dominate the shrub layer that can also include scattered black twinberry, soopolallie, common juniper and Labrador tea. Herbs are similar to the SC ecosystems but sweet coltsfoot and common horsetail are more abundant while grouseberry and crowberry are rather sparse. Mosses form a thick carpet with glow moss being the dominant and heron's bill moss being common, lichens, such as reindeer, and pelt are sparse.

SH *08/09 Sxw - Horsetail - Crowberry/Sxw - Labrador tea – Willow*

Structural Stage: 3b, 4, 5, 6, 7

Site Modifiers mapped: none

This ecosystem occurs on wet sites on toe slope positions and in depressions with a near-surface water table. These sites occur adjacent to willow wetlands and are transitional from wetland to closed forest. Site series /08 and /09 are similar with the exception that /09 has only been found in one location in the core study area on soils derived from acidic rocks. In depressional sites organic accumulations exist which are poorly drained. Mesisols soils are typical with mesimor humus forms.

These very open canopy spruce stands do not fit the description of either site series very well but occur in the hygric position on the edatopic grid. They have a shrub layer of willow with minor components of scrub birch, black twinberry, prickly rose and Labrador tea. Common

horsetail and sedges separate this ecosystem from slightly drier ones. Other herbs include bluejoint, *Cala stricta*, sweet coltsfoot, mitrewort, fireweed, Nagoonberry, twinflower, grass of Parnassus, Sitka burnet, and rein orchid. Mosses are abundant and are dominated by sphagnum, glow moss and leafy mosses.

MS xv – Shrub and Herb Dominated Units

BF *W12 Beaked sedge fen*

Structural Stage: 2

Site Modifiers mapped: none

This Site Series occurs in level depressions where organic blankets have built up. Fibrisol soils with a fibrimor humus are typical but mesic and humic deposits also occur with this ecosystem. Mineral soils, usually Gleysols, may be present at depth. Drainage is imperfect to very poor. Standing water may be present with a depth ranging from 0 to 50cm. These sites are usually inundated early in the growing season with the water level decreasing by mid-August. The SMR ranges both spatially and seasonally but on average is subhydic to hydric while the SNR mesotrophic.

These sedge wetlands are often extremely homogenous. Beaked sedge with water sedge form continuous cover, often up to 80%. Bluejoint is noticeably scattered throughout. Shrubs are very sparse, having less than 5% cover. They are low and hidden by the sedges and include grey-leaved willow and scrub birch. Arrow-leaved coltsfoot is often scattered throughout. Moss cover is not well developed.

BL *Bluebunch wheatgrass - Lichen*

Structural Stage: 2

Site Modifiers mapped: none

See SBPSxc Description.

GL *Grass - Large-leaved avens*

Structural Stage: 2

Site Modifiers mapped: none

See SBPSxc Description.

KG *Kinnikinnick - Grass*

Structural Stage: 2

Site Modifiers mapped: c, r, w

See SBPSxc Description.

SW *Rocky Mountain cow-lily - Water smartweed*

Structural Stage: 2

Site Modifiers mapped: none

See SBPSxc Description.

WH *Willow – Horsetail*

Structural Stage: 3a

Site Modifiers mapped: none

This ecosystem occurs on lower slopes where seepage is abundant and drainage is poor. Organic veneers have developed over till deposits and humus development is a saprimoder. These are lush moist meadows dominated by low willows and horsetails. Black twinberry is sometimes scattered. Spruce and subalpine fir can also be scattered. Herb cover includes arrow-leaved groundsel, Sitka burnet, scarlet paintbrush, bog orchid, cow-parsnip, wild strawberry, yarrow and common pink winter-green. Grasses are a minor component. Glow moss and leafy mosses are common.

WM *W05 (and W04) Grey - leaved willow - Moss shrub carr*

Structural Stage: 3a

Site Modifiers mapped: none

See SBPSxc Description.

WS *W08Bog willow - Sedge low shrub fen*

Structural Stage: 3a

Site Modifiers mapped: k

See SBPSxc Description.

Sub-Boreal Pine-Spruce Biogeoclimatic Zone (SBPS)

SBPSmk (moist cool subzone)

SBPSmk – Forested Ecosystem Units

FA *03 - Fd - Pinegrass – Aster*

Structural Stage: 7

Site Modifiers mapped: none

This site series occurs on southeast to west facing slopes with steep slopes. Surficial materials consist primarily of colluvium. The soil texture is gravelly loam. The SMR is xeric to subxeric and the SNR is submesotrophic to permesotrophic.

Douglas fir is common on these sites, probably because summer frost is relatively infrequent. The mature forest canopy is typically open and patchy and dominated by Douglas fir trees of a range of sizes and ages. Large veteran trees are common. Douglas fir also dominates tree regeneration layers. The undergrowth vegetation typically has a moderate to high cover of pinegrass and showy aster. Scattered low shrubs are present, especially common juniper and birch-leaved spirea. Cover of mosses and lichens is relatively sparse, and exposed mineral soil is common. Douglas fir dominance of the canopy and regeneration layers and the absence of a well-developed moss layer distinguishes the vegetation of these sites.

LP *01 Pl - Pinegrass – Arnica*

Structural Stage: 7

Site Modifier mapped: none

This Site Series is the predominant ecosystem in the SBPSmk. It occurs on zonal sites and other gentle to moderate slopes. Soils are typically greater than 50cm but shallow soils also exist. Textures are typically loamy. The SMR ranges from submesic to mesic while the SNR is submesotrophic to eutrophic.

The sites are vegetated by even-aged lodgepole pine forests with sparse densities of lodgepole pine, hybrid white spruce, and rarely subalpine fir regeneration. Douglas fir is occasionally present in the canopy and regeneration layers. Stands occur as a patchwork of age classes and densities, depending upon fire history. Small aspen stands occur locally. The undergrowth is dominated by pinegrass, bunchberry, twinflower, and a thick carpet of feathermosses (especially red-stemmed feathermoss). Shrubs (especially prickly rose, birch-leaved spirea, and black huckleberry) are common but mostly less than 30 cm tall.

ST *06 Sxw – Twinberry*

Structural Stage: 7

Site Modifiers mapped: none

This is the most common Site Series of the SBPSmk that is wetter than /01 sites. It occurs on lower and toe position of slopes adjacent to stream channels or wetlands. This ecosystem is moist but there is no evidence of persistent seepage or the presence of a water table within the surface. Mineral soils have dull mottles but are not gleyed or associated with the presence of organic soils. The SMR is subhygric while the SNR ranges from submesotrophic to eutrophic.

These sites have relatively cold soils and frequent summer frost beneath canopy openings. The mature forest canopy is dominated by hybrid white spruce or a mixture of lodgepole pine and spruce. Subalpine fir is often present, especially in tree regeneration layers with spruce. Several forbs are present but pinegrass cover is sparse. Low shrubs have a moderate cover and include black twinberry, prickly rose, and highbush–cranberry. The undergrowth vegetation is distinguished by black twinberry, common mitrewort, trailing raspberry, and palmate coltsfoot, and by the absence of common horsetail, soft-leaved sedge, and scrub birch.

SBPS mk – Shrub and Herb Dominated Units

These units are derived from the SBPSxc

BF *W12 Beaked sedge fen*

Structural Stage: 2

Site Modifiers mapped: none

See description in SBPSxc section.

GL *Grass-large-leaved avens*

Structural Stage: 2

Site Modifiers mapped: none

See description in SBPSxc section.

SBPSxc (very dry cold subzone)

SBPSxc - Forested Ecosystem Units

LC *02 Pl- Kinnikinnick – Cladonia*

Structural Stage: 5, 6, 7

Site Modifiers mapped: r, s, w

This Site Series covers a wide range of submesic and drier sites. Included are crest positions and south to west facing slopes. Gradients are gentle in crest positions but reach 70% on upper warm aspect slopes. Surficial materials are till with a sand to loam texture and are well to rapidly drained. Soils range from shallow over bedrock on moderate to steep slopes to deeper on crest positions. There is little humus development. The SMR ranges from xeric to submesic while the SNR ranges from oligotrophic to permesotrophic.

These pine stands, on gentle crest positions, are usually very open in mature stands but can have a dense canopy of up to 60% in the young pole-sapling stage. Fire has been the main source of disturbance. There are very scattered occurrences of subalpine fir and spruce in the shrub layers of some of these stands. Shrub cover of common juniper, prickly rose and soopolallie is quite sparse but juniper may be more common than in the mesic sites. Herbs are scattered and are the same as in the mesic sites although cover of kinnikinnick is greater while that of pinegrass is generally less. The lack of moss in the bryophyte layer indicates

the drier conditions of these submesic ecosystems. *Cladonia*, and pelt lichens are particularly abundant while reindeer and *Stereocaulon* species are more scattered.

LCw3 occurs on steep warm slopes where fire has been a frequent source of disturbance and a tree canopy is lacking, the flora is significantly different to that described above. Aspen is often dominant in the shrub layer with scattered pine, prickly rose and soopolallie. Rocky mountain juniper, Saskatoon berry and wolf willow also occur on these warm slopes. Grasses are the most noticeable ground cover. Bluebunch wheatgrass, pinegrass, and purple reedgrass may all be locally abundant. Flowering herbs can be diverse but with very low cover. These include kinnikinnick, northern bedstraw, yarrow, nodding onion, pussy toes, cut-leaved anemone, spreading dogbane, draba, spike-like goldenrod, small-flowered penstemmon, shrubby penstemmon, and daisy.

LK *01 Pl - Kinnikinnick – Feathermoss*

Structural Stage: 5, 6, 7

Site Modifiers mapped: k, w

This ecosystem occurs throughout the area and is the predominant site series in the SBPSxc. These units are located on zonal sites and gentle, mid to lower slopes of all aspects, excluding steep south or west facing. The surficial material is a till blanket or veneer. Soils are well to moderately well drained Brunisolic Grey Luvisols or Orthic Dystric Brunisols with a silt loam texture and varying amounts of coarse fragments that can reach 85%. A hemimor humus type is usual. The SMR is submesic to mesic and the SNR is submesotrophic to permesotrophic.

Forests are dominated by lodgepole pine but minor amounts of hybrid spruce, and in the younger stands, trembling aspen occur. Crown closure is often only about 15% but increase to 40 or 50% in some stands. Pine regenerates well in the understory and is often the most abundant species in the shrub layer. Spruce and subalpine fir are scattered. Low shrubs are not usually abundant but always include common juniper, soopolallie, prickly rose and sometimes willow. Pinegrass is always present in these mesic sites. It is sometimes rather patchy while on other sites it forms a lush swath beneath the rather open tree canopy. Here it can be up to 50% ground cover. Flowering herbs are always present but they are not particularly diverse. Heart-leaved arnica, twinflower, fireweed, wild strawberry, yarrow and kinnikinnick commonly occur. Pinegrass and kinnikinnick are the most abundant ground cover. Bryophytes are common but lichens are more abundant and diverse than mosses. *Cladonia* and *Cladina* species are dominant. *Peltigera* and *Stereocaulon* are more scattered. Red-stemmed feather moss and *Dicranum* species are rather sparse.

Species do not appear to change significantly from young forests to older forests. Crown closure tends to be rather open in all seral stages.

SB *03 Sxw - Scrub birch - Fen moss*

Structural Stage: 7

Site Modifiers mapped: none

This ecosystem develops on level to very gentle slopes adjacent to shrubby or herbaceous wetlands in lower slope and toe positions where soil conditions are moister than average. However, a persistent near-surface seepage or a water table is absent. The surficial material is till or fluvio-glacial and soils have a high coarse fragment content. The soil matrix texture ranges from a silty clay to a sand, including loam. Drainage is imperfect to poor and

Gleysols have developed as a result. The SMR is subhygric and the SNR is submesotrophic.

Spruce forms the tree canopy in the older stands of this site series while pine is more common in the young stands. Disturbance has been caused by fire. There is little regeneration of tree species in the understorey but scrub birch and Bebb's willow form quite a dense shrub layer. Other shrubs of more mesic sites such as common juniper, prickly rose and soopolallie are present in small amounts. Herbs are quite varied but they are not abundant. Northern bedstraw, wild strawberry, fireweed, yarrow, meadowrue, paintbrush, twinflower, nagoonberry, cut-leaved anemone, showy aster, kinnikinnick and coltsfoot are scattered. Glow moss is abundant while Dicranum species and pelt lichens are sparse.

SF *04 Sxw - Scrub birch – Feathermoss*
Structural Stage: 5, 6, 7
Site Modifiers mapped: none

This Site Series occurs on lower slopes with intermittent to persistent seepage but no water table within 50cm of the surface. It is most commonly at the perimeter of herbaceous wetlands and occasionally as a narrow zone upslope of the SBPSxc /03. Soil texture is typically loamy. The SMR is subhygric and the SNR ranges from medium to rich.

Growing-season frost is probably less common than in /03 sites. The mature forest canopy is typically closed, and dominated by white spruce and lodgepole pine. Spruce regeneration is common. A moderate cover of low shrubs and a relatively rich variety of forbs characterize the undergrowth vegetation. Abundant coltsfoot and black twinberry, but little or no common horsetail or scrub birch, distinguishes the vegetation. Shrub cover is generally less than in the /03 site series.

SH *05 Sxw - Horsetail - Glow moss*
Structural Stage: 4, 5, 6, 7
Site Modifiers mapped: none

These moist sites are very limited in occurrence. They occur in depressional areas and lower and toe slope positions where the water table is at or close to the surface. Slightly drier hummocks alternate with wet depressions in sites. Soil textures include loamy, sandy, and silty. The SMR ranges from subhygric to hygric and the SNR from submesotrophic to permesotrophic.

These moist ecosystems have a very open canopy of spruce with a dense layer of green alder beneath. Other shrubs, black twinberry, prickly rose and black gooseberry are sparse. Herbs are lush and indicative of moist conditions. Common horsetail, sedges and grasses dominate. Other herbs include aster, kidney-leaved violet, small bedstraw, and dandelion. The bryophytic layer includes leafy mosses and palm moss but it is not well developed.

SBPSxc - Shrub and Herb Dominated Ecosystem Units

BF *W12 Beaked sedge fen*
Structural Stage: 2, 3

Site Modifiers mapped: none

These herbaceous fens occur in level depressions where organic blankets have built up. These ecosystems are inundated early in the growing season but standing water often recedes by mid-August. The soils are typically Fibrisols with fibrimor humus development, however mesic and humic deposits also exist. Drainage is imperfect to very poor. The SMR varies both spatially and seasonally, ranging from subhydic to hydic

These sedge wetlands are often extremely homogenous. Beaked sedge with water sedge form continuous cover, often up to 80%. Bluejoint and slimstem reedgrass are noticeably scattered throughout. Shrubs are very sparse, having less than 5% cover. They are low and hidden by the sedges and include grey-leaved and Barclay's willows and scrub birch. Sickie moss may form a cover of up to 20% but moss cover is often not well developed.

DS W07 Drummond's willow - Sedge swamp

Structural Stage: 3b

Site Modifiers mapped: none

These ecosystems are associated with streamside locations and tend to be narrow though sometimes of considerable length. The sites are level to very gently sloping in toe positions on fluvial deposits. Drainage is imperfect but flooding occurs frequently resulting in Regosol or Gleysol soil orders. Textures range from loamy to sand. Soils are usually saturated throughout the growing season. The mull humus forms present reflect the rich nutrient conditions. The SMR is hygric to hydic.

Tall shrubs of Drummond's, grey-leaved and tea-leaved willows separate these wetlands from other shrub fens identified. Isolated pine and spruce saplings may occur. Black twinberry, black gooseberry and scrub birch will be scattered as low shrubs. Herbs vary in species from site to site but can include leafy aster, field mint, Sitka burnet, meadowrue, violets, fireweed and large leaved avens. Beaked and water sedge can also be common. The moss layer is poorly developed or absent.

DT Dandelion - Timber oat-grass (2)

Structural Stage: 2

Site Modifiers mapped: none

These sites occur along roads or adjacent to buildings where cattle use has been prolonged. They are flat to gently sloping in a lower slope position but the defining factor is cattle use rather than the physical variables.

These mesic to moist herbaceous meadows have been degraded by cattle grazing. Dandelions are always present but the ecosystem is dominated by a variety of grasses. These include timber oat grass, brome, and Wheeler's bluegrass. Yarrow and field chickweed are usually quite common.

GL Grass - Large-leaved avens (2)

Structural Stage: 2

Site Modifiers mapped: none

These meadows are limited to mineral soils adjacent to small creeks. They develop on fine textured clayey loam fluvial deposits with no coarse fragments. Drainage is imperfect to poor and soils are gleyed. Humus forms are mesimors

These are moist meadows along creeks dominated by a variety of grasses. These include timothy, wheatgrass, Kentucky bluegrass, and several other species. Wild strawberry, fireweed, Sitka burnet, sheep sorrel, western dock, small-flowered penstemmon, marsh valerian, dandelion and large-leaved avens are all common. In wetter areas sedges increase.

KG Kinnikinnick – Grass

Structural Stage: 2

Site Modifiers mapped: c, k, r, s, w

These dry ecosystems usually occur on the crests and warm aspect slopes of the fluvioglacial kames and eskers that dot the landscape. This Site Series is also located on steep warm slopes of till deposits that occur adjacent to wetlands. Slopes vary from 5% on crests to up to 65% on the warm aspect slopes. Aspects range from 172 to 252 degrees. Soils are well drained with some coarse fragments but no humus development.

Kinnikinnick, covering at least 20% of the ground, is always present on these dry slopes. An average of 25% of the ground surface is unvegetated and consists of bare mineral soil and rocks. Grasses are usually dominant but vary in their composition. Bluebunch and slender wheatgrass are consistently present while pinegrass, junegrass or needlegrass species may also be quite abundant. Common juniper is usually scattered as are small shrubby aspen saplings. Nodding onion is often scattered while other herbs are sparse and vary from site to site. They may include pussytoes species, old man's whiskers, locoweed, showy Jacob's ladder and wild strawberry.

SW Rocky Mountain cow-lily - Water smartweed

Structural Stage: 2

Site Modifiers mapped: none

This ecosystem occurs in parts of shallow lakes where the vegetation cover exceeds 10%. They merge with open water of the deeper parts of the lakes and sedge fens on the landward side.

Areas of shallow water have significant vegetation cover dominated by Rocky Mountain cow-lily and water smartweed whose leaves are floating on the surface. Other aquatic species include narrow-leaved bur-weed and common spike-rush but these are scattered.

WM W5 (and W4) Grey-leaved willow - moss shrub carr

Structural Stage: 3a

Site Modifiers mapped: none

Shrub carrs occur in lower slope and level positions on gentle slopes on any aspect. They are wetter than SBSa/W4, but still do not have standing water between hummocks. Drainage is imperfect to poor and soils are usually Gleysols with an organic veneer. Soil textures are loams with a high coarse fragment including silty clay loam, silt loam, sandy clay loam, and sandy loam. Soil orders include Regosols and Gleysols. Humus forms are humimors and hemimors. The SMR is subhygric to hygric

Grey-leaved willow and scrub birch forms a dense shrub layer that is about one to two metres in height. Cover is usually greater than 60%. Other shrubs, such as Barclay's willow, hoary willow may have sparse cover. In some sites black twinberry, prickly rose and short-fruited willow are scattered. The odd spruce or pine sapling may occur. Beaked sedge and water sedge are usually present but are significantly less abundant (< 30% cover) than in the sedge wetlands. Other herbaceous species are very diverse but individual cover is low. Coltsfoot, both arrow-leaved and sweet, occurs most consistently while asters, northern gentian, meadowrue, large-leaved avens, yarrow, wild strawberry, graceful cinquefoil and marsh valerian commonly occur. Moss cover is often rather insignificant with glow moss, followed by fuzzy golden moss, being the most common species. In some sites it forms a thick carpet.

WS *W8 Bog willow - Sedge low shrub fen*

Structural Stage: 3a

Site Modifiers mapped: none

This Site Series occurs on organic blankets or veneers in depressional areas. They typically have an irregular microtopography surface expression sometimes ribbed in a net pattern. Slopes are negligible and drainage is poor to very poor with the water table at or near the surface for most of the year. The organic materials are usually Fibrisols with fibrimor humus at the surface, but mesic and humic organic materials may also be present. The SMR is subhydric.

Grey-leaved willow, scrub birch and Barclay's willow are the most common low shrubs in this wetland. Bog willow itself has not been identified within the study area. Sedges, usually dominated by water and beaked sedges, form a dense cover of greater than 60%. In some sites the shrubs were lower than the sedges while in others they were up to one metre in height and very noticeable. Bluejoint is quite common and scattered herbs may include large-leaved avens, coltsfoot and Sitka burnet but herb diversity and coverage is much lower than in the shrub carr (WM). There is a thick moss cover dominated by glow, golden fuzzy and sickle mosses.

In one or two sites sphagnum mosses were common but other species indicators of bog conditions such as Labrador tea, western bog-laurel, crowberry and bog cranberry were either very sparse or lacking and these sites have been mapped as WS. Spruce in the tree and shrub layers form a noticeable but sparse component at a few sites but the total tree species cover is always less than 10% in total. The remaining vegetation remains unchanged although sedge coverage is somewhat reduced. These wet, organic sites are not identified as forested site series and are included in the WS.

Non Vegetated, Sparsely Vegetated and Anthropogenic Units*CF Cultivated Field (2)*

These tilled vegetated sites are dominated by non-native plants and are generally irrigated. Ranches are concentrated along the larger drainages such as the Fraser and Chilcotin Rivers and Dog Creek, with cultivated fields on the valley bottoms, lower terraces and fans. Alfalfa hay is the most common crop.

CL Cliff (1)

Site Modifiers mapped: z

The very steep rock cliffs are primarily non-vegetated, but trees, usually Douglas fir, and other plants occur in low covers on ledges and in crevices. Fairly extensive cliffs of basalt lava flows occur along the western rim of the Fraser River valley and its tributaries, while the eastern side and lower scarps consist mostly of softer sedimentary rocks. The warm aspect basalt cliffs are especially important for wildlife such as bats and raptors, while the softer sedimentary cliffs on warm aspects are extensively used by California bighorn sheep as escape terrain.

ES Exposed Soil (1)

Site Modifiers mapped: k, w

This is primarily a non-vegetated unit. It is affiliated with the very dry, steep ecosystems on undifferentiated surficial materials on the Chilcotin River and Fraser River canyon walls, as well as some of their larger tributaries, where surface erosion is a common site feature. Those on the north side of the Chilcotin River and along the Fraser River are used as escape terrain by the California bighorn sheep.

GB Gravel Bar (1)

These sites are mostly non-vegetated coarse-textured surficial material on active floodplains along the Chilcotin and Fraser Rivers and their larger tributaries. Annual flooding prevents establishment of plant communities and may shift the form and location of these features from year to year.

MU Mudflat Sediment (1)

In the study area these are mostly non-vegetated sites where there are alkali precipitates on the surface. The extremely high salinity prevents plant growth. These sites are adjacent to shallow open water (OW) and seasonally flooded. Soils are generally saturated and gleyed.

LA Lake

These are large bodies of water more than two metres deep that always remain unvegetated.

OW Shallow Open Water

These shallow open water ecosystems usually occur as the deepest part of a wetland complex. Submerged plants may be quite dense, but the water is generally too deep for emergent plants, although they may form some sparse cover. Water depth, always less than two metres, may vary considerably from year to year and season to season. Wetland complexes with shallow open water form important wildlife habitat but they are also heavily used by cattle and horses as watering holes.

RI River

The Fraser River flows through the study area in the BGxw2 variant.

RO Rock Outcrop (1)

Site Modifiers mapped: w

Rock outcrops are level to steep bedrock surfaces with negligible soil development and less than 10% vascular plant cover.

RP Road Surface

This is an area cleared and compacted for the purposes of transporting goods and services by vehicle.



Appendix 8

MINE SITE STUDY AREA – VENUS DATABASE – DIGITAL COPY

See digital copy included.



Appendix 9
MINE SITE STUDY AREA
SUMMARY OF PLOT DATA AND CODES USED

CODES USED IN PLOT DATA SUMMARIES

For BEC units, ecosystems, structural stages, site modifiers, and drainage codes, please refer to Appendix 6.

1. SOIL MOISTURE REGIME (SMR) – (As Per Table 2.2 In Ministry of Forests 1996)

Code	Class	Description	Primary water source
0	Very xeric	Water removed extremely rapidly in relation to supply; soil is moist for a negligible time after precipitation	precipitation
1	Xeric	Water removed very rapidly in relation to supply; soil is moist for brief periods following precipitation	precipitation
2	Subxeric	Water removed rapidly in relation to supply; soil is moist for short periods following precipitation	precipitation
3	Submesic	Water removed readily in relation to supply; water available for moderately short periods following precipitation	precipitation
4	Mesic	Water removed somewhat slowly in relation to supply; soil may remain moist for a significant, but sometimes short period of the year. Available soil moisture reflects climatic inputs.	precipitation in moderate- to fine-textured soils and limited seepage in coarse-textured soils
5	Subhygric	Water removed slowly enough to keep soil wet for a significant part of growing season; some temporary seepage and possibly mottling below 20 cm	precipitation and seepage
6	Hygric	Water removed slowly enough to keep soil wet for most of growing season; permanent seepage and mottling; gleyed colours common	seepage
7	Subhygric	Water removed slowly enough to keep water table at or near surface for most of year; gleyed mineral or organic soils; permanent seepage < 30 cm below surface	seepage or permanent water table
8	Hydric	Water removed so slowly that water table is at or above soil surface all year; gleyed mineral or organic soils	permanent water table

2. SOIL NUTRIENT REGIME (SNR) (as per item 21 in Ministry of Forests 1998)

Enter a code (A-F) for nutrient regime, indicating the available nutrient supply relative to other sites within the same biogeoclimatic unit. Base the assessment on a combination of environmental factors, soil properties, and indicator plants. Features that are strongly expressed may compensate for other factors to create richer or poorer conditions. Classes are listed with some criteria in the following table.

If two or more areas of plot have a distinctly different nutrient regime, enter the code of the dominant class, and give the range (e.g., C, B-C).

Where the nutrient regime is *distinctly* transitional between two classes, enter closest class followed by an asterisk and explain under "Notes" (e.g. C*).

Table 6-2 Nutrient regime classes and relationships between nutrient regime and site properties.

	Oligotrophic	Submesotrophic	Mesotrophic	Permesotrophic	Eutrophic	Hypereutrophic
	A very poor	B poorer than average	C medium	D richer than average	E very rich	F saline
Available nutrients	very low	low	average	plentiful	abundant	excess salt accum.
Humus form	Mor			Moder		Mull
A horizon	Ae horizon present		A horizon		Ah horizon present	
Organic matter content	low (light coloured)		medium (inter. in colour)		high (coloured)	
C:N Ratio	high		moderate		low	
Soil depth	extremely shallow		very shallow to deep			
Soil texture	coarse textured		medium to fine textured			
% Coarse fragments	high		moderate to low			
Parent mat. mineralogy	base-low		base-medium		base-high	
Soil pH	extremely-mod. acid		moderately acid-neutral		slightly acid-mildly alk.	
Water pH (wetlands)	<4-5	4.5-5.5	5.5-6.5	6.5-7.4	7.4+	
Seepage			temporary	permanent		

3. MESOSLOPE POSITION (as per item 2.10 In Ministry of Forests 1996)

Indicate the position of plot relative to the localized catchment area

CR Crest The generally convex uppermost portion of a hill; usually convex in all directions with no distinct aspect.

UP Upper Slope The generally convex upper portion of the slope immediately below the crest of a hill; has a specific aspect.

MD Middle Slope Area between the upper and lower slope; the surface profile is generally neither distinctly concave nor convex; has a straight or somewhat sigmoid surface profile with a specific aspect.

LW Lower Slope The area toward the base of a slope; generally has a concave surface profile with a specific aspect.

TO Toe The area demarcated from the lower slope by an abrupt decrease in slope gradient; seepage is typically present.

DP Depression Any area concave in all directions; may be at the base of a meso-scale slope or in a generally level area.

LV Level Any level meso-scale area not immediately adjacent to a meso-scale slope; the surface profile is generally horizontal and straight with no significant aspect.

4. SURFACE TOPOGRAPHY (as per item 2.11 in Ministry of Forests 1996)

Note the general surface shape and the size, frequency, and type of microtopographic features. Describe to the level that best represents what you see, separating coding with periods (e.g., code a generally straight surface that is slightly mounded as **ST.sl.mnd** and a generally concave surface that is relatively flat as **CC.smo**).

General surface shape:

CC. Concave – surface profile is mainly “hollow” in one or several directions

CV. Convex – surface profile is mainly “rounded” like the exterior of a sphere

ST. Straight – surface profile is linear, either flat or sloping in one direction

5. DRAINAGE CLASS (as per Table 2.15 in Ministry of Forests 1998)

Drainage class describes the speed and extent to which water is removed from a mineral soil in relation to additions.

Table 6-3. Drainage classes and codes

Code	Class	Description
x	Very rapidly drained	Water is removed from the soil very rapidly in relation to supply. Water source is precipitation and available water storage capacity following precipitation is essentially nil. Soils are typically fragmental or skeletal, shallow, or both.
r	Rapidly drained	Water is removed from the soil rapidly in relation to supply. Excess water flows downward if underlying material is pervious. Subsurface flow may occur on steep gradients during heavy rainfall. Water source is precipitation. Soils are generally coarse textured.
w	Well drained	Water is removed from the soil readily, but not rapidly, Excess water flows downward readily into underlying pervious material or laterally as subsurface flow. Water source is precipitation. On slopes, subsurface flow may occur for short durations, but additions are equalled by losses. Soils are generally intermediate in texture and lack restricting layers.
m	Moderately well drained	Water is removed from the soil somewhat slowly in relation to supply because of imperviousness or lack of gradient. Precipitation is the dominant water source in medium- to fine-textured soils; precipitation and significant additions by subsurface flow are necessary in coarse-textured soils.
i	Imperfectly drained	Water is removed from the soil sufficiently slowly in relation to supply to keep the soil wet for a significant part of the growing season. Excess water moves slowly downward if precipitation is the major source. If subsurface water or groundwater (or both) is the main source, the flow rate may vary but the soil remains wet for a significant part of the growing season. Precipitation is the main source if available water storage capacity is high; contribution by subsurface or groundwater flow (or both) increases as available water storage capacity decreases. Soils generally have a wide range of texture, and some mottling is common.
p	Poorly drained	Water is removed so slowly in relation to supply that the soil remains wet for much of the time that it is not frozen. Excess water is evident in the soil for a large part of the time. Subsurface or groundwater flow (or both), in addition to precipitation, are the main water sources. A perched water table may be present. Soils are generally mottled and/or gleyed.

Code	Class	Description
v	Very poorly drained	Water is removed from the soil so slowly that the water table remains at or near the surface for most of the time the soil is not frozen. Groundwater flow and subsurface flow are the major water sources. Precipitation is less important, except where there is a perched water table with precipitation exceeding evapotranspiration. Typically associated with wetlands. For organic wetlands, also evaluate the soil moisture subclass, and when entering on the form, separate from drainage by a slash. For example, v/ac.

6. SOIL TEXTURE

C	CLAY
CL	CLAY LOAM
FSL	FINE SANDY LOAM
HC	HEAVY CLAY
L	LOAM
LS	LOAMY SANDY
O	ORGANIC
S	SAND
SC	SANDY CLAY
SCL	SANDY CLAY LOAM
Si	SILT
SiC	SILTY CLAY
SiCL	SILTY CLAY LOAM
SiL	SILT LOAM
SL	SANDY LOAM

7. TERRAIN (from Howes and Kenk 1988)

See following pages.

insert example terrain symbol

insert field card of codes 1st page

insert field card of codes, page 2

1997 AND 1998 PLOT CARD INFORMATION

Plot No.	Photo #	Surveyors	Date	Elev.	Slope	Aspect	SMR	SNR	Slope Pos.	Surface shape	Disturbance	Drainage	Soil Texture	Soil Class	Coarse Frag.%	Humus Form	Terrain	BEC Unit	Site Series	Site Modifier	Structural Stage	Crown Closure
GH001	93100-171	HR/DA	23/07/97	1495	20	20	2 or 3	D	MD	ST								MSxv	LG		2	
GH002	93100-171	HR/DA	23/07/97	1470	22	25	3	D	MD	ST								SBPSxc	LK		1b	
GH006	93098-163	HR/DA	23/07/97	1505	0	999	2 or 3	B	LV	CV		r-w	SL			none		SBPSxc	LK		5	15
GH008	93098-163	HR/DA	23/07/97	1500	18	140	1 or 2		CR	CV								SBPSxc	LC		3a/2	
GH011	93098-163	HR/DA	23/07/97	1485	5	270	5 or 6		LW	ST		w	LS		0 in top 10cm			SBPSxc	SB		6 or 7	10
GH013	93098-163	HR/DA	23/07/97	1420	0	999	7		DP	ST								SBPSxc	WS		4	
GH014	93098-163	HR/DA	23/07/97	1420	0	999	7	C	DP	ST		w-m						SBPSxc	WS		4	30
GH020	93098-163	HR/DA	23/07/97	1500	0	999	7	D	DP	ST		l			0	Rhizomul??	zsFAp	SBPSxc	WM		3b	
GH021	93099-061	HR/JR	24/07/97	1645	8	270	4	C?	UP	ST		i	SiL		10			MSxv	LG		3b	
GH031	93099-168	HR/JW	24/07/97	1530	5	280	5	C	LW	ST		i						MSxv	SG		3a/2	
GH048	93106-008	HR/JW	25/07/97	1550	0	90	1 or 2		LV/CR	CV								MSxv	LK		3a/2	
GH068	93100-067	HR/DA	26/07/97	1550	0	999	7	C	DP	ST	?	i	SL/CL	Or. G.	5 over 60	Resimor	Ox/sgF?	MSxv	WS		6	10
GH071	93100-067	HR/DA	26/07/97	1540	5	120	5 or 6	C-D	LW	ST	none	p	CL	Or.Re. G.	0	Mesimor	czFp?	MSxv	SG		2	
GH075	93100-067	HR/DA	26/07/97	1570	20	300	5	B	MD	ST	WIN	m	SL over L	?	5 over 75	Hemimor	sdMp	MSxv	LG		6	25
GH093	93101-177	HR/JW	27/07/97	1455	2	280	3	D	MD	CC		i						SBPSxc	LK		2	
GH107	93100-171	HR/DA	27/07/97	1455	0	999	7	D	DP	ST		i						SBPSxc	WS		3a	
GH110	93100-171	HR/DA	28/07/97	1485			2 or 3	D	UP	ST		i					Ovj	MSxv	LG		3a	
GJ002	93100-170	JT/JW	22/07/97	1530	5	359	3	C	MD	ST								MSxv	LG		3a/2/6	
GJ004	93100-170	JT/JW	22/07/97	1455	0	999	6 or 7	C	LV DP ->		BIO-d							MSxv	WS		2	
GJ005	93100-170	JT/JW	22/07/97	1520	25	?	3	D	MD		BIO-w (moose)							MSxv	LG		3a	
GJ006	93100-170	JT/JW	22/07/97	1520	20/25	180	2 or 3	C	MD									MSxv	LG		2/3b	
GJ007	93098-161	JT/JW	23/07/97	1465	0	999	3 or 4	E	LV	ST	BIO-d/w (moose/musk rat?)							SBPSxc	LK			1b
GJ008	93098-161	JT/JW	23/07/97	1475	1	999	4	D	LV	ST	BIO-d?							MSxv	LG		3a	
GJ009	93098-161	JT/JW	23/07/97	1475		999	4	B	LV		BIO-d							SBPSxc	LK		1b 2	
GJ010	93098-161	JT/JW	23/07/97	1480	0	999	3 or 4	B	LV		BIO-d							MSxv	LG		2	

Plot No.	Photo #	Surveyors	Date	Elev.	Slope	Aspect	SMR	SNR	Slope Pos.	Surface shape	Disturbance	Drainage	Soil Texture	Soil Class	Coarse Frag.%	Humus Form	Terrain	BEC Unit	Site Series	Site Modifier	Structural Stage	Crown Closure
GJ012	93099-063	JT/JW	23/07/97	1485	0	999	7	E	DP	ST	WIN & BIO-w(moose)								MSxv	SH		2
GJ014	93099-063	JT/JW	23/07/97	1495	12	270		E			BIO-d/w(moose)							SBPSxc	LK		2	
GJ015	93099-063	JT/JW	23/07/97	1485	0	999	7	C	DP		FIR							SBPSxc	BF		3b	
GJ016	93099-062	JT/JW	23/07/97	1480	0	999	8	D	DP	ST	*??*?							SBPSxc	WS		3a	
GJ017	93099-062	JT/JW	23/07/97	1475	0	999	3 or 4	C	LV	ST								SBPSxc	LK		6	
GJ020	93100-173	JT/DA	24/07/97	1815	0-10	av. 180	1	C	CR	CV	FIR							MSxv	LK		6	
GJ021	93100-173	JT/DA	24/07/97	1785	50	210	0-1	B	UP		FIR							MSxv	TA		3b	
GJ022	93100-173	JT/DA	24/07/97	1780	28	210	2	B	UP		FIR							MSxv	LK		6/3a	
GJ024	93100-173	JT/DA	24/07/97	1710	0	999	8	C	DP	ST	FIR							MSxv	BF		2	
GJ025	93100-173	JT/DA	24/07/97	1710	0-40	999 (varied)	1 or 2	C	CR		FIR							MSxv	GK		2	
GJ028	93100-173	JT/DA	24/07/97	1700	<5	999	1 or 2	D	CR									MSxv	GK		3a	
GJ029	93100-173	JT/DA	24/07/97	1690	0	999	6	C	LW		FIR							MSxv	WH		4	
GJ030	93100-173	JT/DA	24/07/97	1660	22	220	4	C	MD	ST	FIR							MSxv	LG		2	
GJ031	93100-173	JT/DA	24/07/97	1615	5	180	4 or 5	E	MD	ST								MSxv	SC		2	
GJ034	93100-173	JT/DA	24/07/97	1570	1	220	5	D	MD-LW									MSxv	SG		2	
GJ036	93101-076	JT/DA	24/07/97	1545	0	999	5 or 6	C	DP	ST	FIR/BIO-d							MSxv	SG		2	
GJ039	93101-076	JT/DA	25/07/97	1455	0	999	3	D	LV									SBPSxc	LK		2	
GJ041	93101-179	JT/DA	25/07/97	1540	0	999	8	B	DP	ST	FIR							MSxv	WS		6	10
GJ046	93101-179	JT/DA	25/07/97	1530	0	999	8	C-D	DP									MSxv	BF		3a	
GJ047	93101-179	JT/DA	25/07/97	1495	65	230	2 or 3	D	UP	ST								SBPSxc	KG		2	
GJ048	93101-179	JT/DA	25/07/97	1490	1	999	7 or 8	C	TO	ST	cattle							SBPSxc	WS		2	
GJ063	93100-169	JT/JW	26/07/97	1565	0	999	3	A or B	LV	ST	FIR	r	SL/L/S	Or. D.B.	80	none	gskFGr?	SBPSxc	LC		5	12
GJ068	93100-169	JT/JW	26/07/97	1565	0	999	3	B	LV	ST	FIR	w	SL	OD Brunisol	70	not developed	sgKMj	SBPSxc	LG*		6	17
GJ070	93100-169	JT/JW	26/07/97	1540	22	20	3 or 4	B-C	UP/MD	ST	none	vp					Fibrimor	Ov	SBPSxc	LK	3a	
GJ072	93101-077	JT/JW/HR	27/07/97	1460	10	20	4	D	LW			p					Ov	SBPSxc	LG*		2	0
GJ073	93101-077	JT/JW/HR	27/07/97	1460	10	20	6	C/D	MD-LW	ST		w					Mvj	SBPSxc	WS		7	40
GJ083	93101-077	JT/DA	27/07/97	1465	0	999	4	B	LV			w					Mvj	SBPSxc	LK		6	15
GJ088	93101-075	JT/DA	27/07/97	1495	5	220	5	C	MD-LW	CC		p						SBPSxc	SF		7	20

Plot No.	Photo #	Surveyors	Date	Elev.	Slope	Aspect	SMR	SNR	Slope Pos.	Surface shape	Disturbance	Drainage	Soil Texture	Soil Class	Coarse Frag.%	Humus Form	Terrain	BEC Unit	Site Series	Site Modifier	Structural Stage	Crown Closure
GJ095	93101-075	JT/DA	27/07/97	1515	0	999	4	C	LW	CC/CV		w	D					MSxv	LG		4	25
GJ107	93100-169	JT/JW	28/07/97	1460	65	60	4 or 5	C	MD/LW	ST		w						SBPSxc	LK		5	30
GJ113	93099-063	JT/HR	28/07/97	1565	12	70	4	D	MD	ST								MSxv	LG		2/3a	0
GJ116	93101-075	JT/HR	28/07/97	1585	5	230			MD	ST							Mv	MSxv	LG		5	20
GK3-01	93100-169	HKP	16/6/93	1450	1	999	5	D	DP	CC								SBPSxc	WM		2	
GK3-02	93100-169	HKP	16/6/93	1450	1	999	5	D	DP	CC								SBPSxc	BF		2 - 3a	
GK3-03	93100-171	HKP	17/6/93	1525	19	157	3	b	MD	CV								SBPSxc	LK		4	
GK5-23	93101-77	HKP	24/8/95	1535	2	75	0?		CR									SBPSxc	LC		4	30
GK5-26	93101-079	HKP	24/8/95	1530	25	260	0	C	CR	CV								SBPSxc	BL		4	
GK5-29	93101-077	HKP	24/8/95	1470	7	10	7		DP	CV								SBPSxc	WM		2	
GK5-30	93101-177	HKP	25/8/95	1470	2	10	6		LV		FIR							SBPSxc	WM		5	
GK5-38	93106-007	HKP	26/8/95	1570	3	10	2		CR		FIR							MSxv	GK		3b	
GM001	93100-071	MR/TM	9/6/97		5	317		B/C	LW-LV	ST	FIR/WIND		SL				Mb	SBPSxc	Flood plain		5	15
GM002	93100-071	MR/TM	9/6/97		3	10		B	LV	ST	FIR	w		Br. G.L.	50	Hemimor	spMb(v?)	SBPSxc	DT		5	25
GM003	93100-071	MR/TM	9/6/97		3	307	5	B	LV	ST	FIR	w		?	80	Hemimor	dMvj	SBPSxc	floodplain		6	12
GM004	93100-071	MR/TM	9/6/97				6	B	LV	CC		l		gleysol	85	Humimor	psMxj	SBPSxc	SH/SM		6 with 4	15
GM005	93100-071	MR/TM	9/6/97		5	354	4	C	L.S.	ST		i		fibrisol	0	fibrimor	Ob?	SBPSxc	LK		2	
GM006	93100-069	MR/TM	9/6/97		60+	183	0-1	C	MD	CV		i		fibrisol		fibrimor	Ob?	SBPSxc	LC		3a	0
GM007	93100-069	MR/TM	9/6/97		30+	224	0	C	UP	CV		i		Fibrisol?		Fibrimor?	Ov/b	SBPSxc	KG		3a	0
GM008	93100-069	MR/TM	9/6/97		5	311	7	B	valley floor	CC	FIR	w	SL	Br.G.L.	6	hemimor		SBPSxc	WS		4	30
GM009	93100-069	MR/TM	9/6/97		70+	224	0-1	D	MS	ST	FIR?	imp	SL	O.G.L.	60	Humimor		SBPSxc	LC		6 or 7	20
GM010	93101-077	MR/TM	10/6/97		3	182	7	B		FIR		w	SiL	C	60	Hemimor	dgMvu	SBPSxc	WS		5 or 6	23
GM011	93101-077	MR/TM	10/6/97				7	B	DE	CC	FIR	w	SL	Brunisol	60	hemimor	sdMb ?	SBPSxc	BS		6	35
GM012	93101-077	MR/TM	10/6/97				7	B	DE	CC		p			0		Of	SBPSxc	BS		2	none
GM013	93101-077	MR/TM	10/6/97		3	272	7	B	LS	ST		w			>60		Mb	SBPSxc	WM		5	50
GM014	93101-177	MR/TM	10/6/97		0-5	160	0	B	CR	CV		w		?		?none LV on B	MD?	SBPSxc	BL		4	45
GM015	93101-177	MR/TM	10/6/97		3	179	0	C	CR	CV	FIR	w	SL	Brunisolic	60	Hemimor	sdMb (p)	SBPSxc	BL		3b	
GM016	93101-177	MR/TM	10/6/97				7	C	CR	CC	FIR & WIN	w-m	SL	Brunisolic?	80?	Hemimor	sdMb?	SBPSxc	BF		7	17

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GM017	93101-177	MR/TM	10/6/97				7	C	CR	CC		m	SL		>70	? Cr. onto Mineral	sdMb	SBPSxc	BF		3b	5
GM020	93100-069	MR/TM/GR	11/6/97		5	302	4	B	MD	ST		w	SL		60		a/k Cb	SBPSxc	LK		5	15
GM021	93100-069	MR/TM/GR	11/6/97				7	C	plateau	depression	none	vp		Mesisol		Mesimor	uOb	MSxv	WS		2	
GM022	93100-069	MR/TM	11/6/97		15	238	3	B	plateau & CR	ST		r			>70		dMr??	MSxv	LG		5	
GM023	93100-069	MR/TM	11/6/97		10	214	2	B	CR	CV		w	SL		>60	early Hemimor?	sdMb	SBPSxc	KG		4	30
GM024	93100-069	MR/TM	11/6/97		60	256	3	D	LW	ST		p		?	0	Saprimoder	hOv?Mb?	SBPSxc	LC		2	4
GM025	93100-069	MR/TM	11/6/97		65+	265	2	C	UP	CV - ST	FIR	m			????	Huumimor		SBPSxc	LC		5	15
GM026	93100-069	MR/TM	11/6/97		60	262	2	C/D	LW	ST	none?		SiCL?		60	Resimor	cdMj?	SBPSxc	LC		6 or 7	17
GM027	93100-170	MR/TM	12/6/97	2140	55	201	2	B-C	LW	CV		m	SiL	Brunisolic Luvisol?	60	Hemimor	zgdMbj	SBPSxc	KG		5	20
GM028	93100-170	MR/TM	12/6/97	2260	60-80+	228	0	C	UP	ST		l-p				humimor	Ox/Mb	SBPSxc	TA		3a	0.5
GM029	93100-170	MR/TM	12/6/97	2260	0-20	228	2	C	UP	CV - ST		m	L		60	Hemimor	gdMb?	SBPSxc	TA		4	25
GM030	93100-170	MR/TM	12/6/97	2380	10	200?	2	C	CR	CV	none	l	SiL		YES	humimor	?zM	SBPSxc	LK		3a/6	8
GM031	93100-170	MR/TM	12/6/97		3	28	7	C	valley floor	ST	FIR	m	SL		10	Hemimor	dsMp?	SBPSxc	WS		??	15
GM032	93100-170	MR/TM	12/6/97	1980			8	C		FIR		w	LS	Br. or Luv.	>60	Hemimor	sdMk	SBPSxc	WS		4	40
GM033	93100-170	MR/TM	12/6/97	2200	25	207	2	C	UP	ST			SiL		80	hemimor	Mj	SBPSxc	LK		6	45
GM034	93100-170	MR/TM	12/6/97	2180			7		valley	depression	FIR	m	SL-SiL		40	hemimor	Mj	SBPSxc			6 or 7	45
GM035	93100-170	MR/TM	12/6/97	2100	20	316	3	D	LW	ST	BIO-b	p						SBPSxc	LK		3	0
GM036	93099-064	MR/TM	13/6/97	3120	15	145(varies)	2		CR	CV								MSxv	LK		4	25
GM039	93099-167	MR/TM	13/6/97	2500			8		depr.	CC								MSxv	WS		5	
GM040	93101-076	MR/TM	14/6/97	2020?	55	220	2	B	LW	CV		l						SBPSxc	KG		4	
GM041	93101-076	MR/TM	14/6/97	2020	up to 30	varies	2		LW	very CV								SBPSxc	KG			
GM042	93101-076	MR/TM	14/6/97	2015	5	240	6	C	depr.	ST								SBPSxc	WM		2	
GM043	93101-076	MR/TM	14/6/97	2080	40	varies	2		LW	CV								SBPSxc	LK		3a	
GM044	93101-076	MR/TM	14/6/97	2020	up to 40	varies	2		LW	CV								SBPSxc	KG		2	

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GM045	93101-076	MR/TM	14/6/97	2020			9	A	depr.	ST							sgkFGr	SBPSxc	BF		2		
GM046	93101-076	MR/TM	14/6/97	2045			9	C	depr.	CC		l						SBPSxc	BF		3a		
GM047	93101-076	MR/TM	14/6/97	2100	30-40	223	2	B				r	SL/LS			poorly developed??	Mur?	SBPSxc	BL		4(5)	10	
GM048	93101-076	MR/TM	14/6/97	2320	5 to 10	95	1			CV								SBPSxc	BL		3a		
GM055	93099-063	MR/TM	9/8/97		3	51		B	valley floor	ST	FIR	r	Sil	Br.G.L.	30	none	Mvj	SBPSxc	WS		6	10	
GM056	93099-167	MR/TM	10/8/97				7	B or C	DEP.	ST		w	SL		60	Hemimor (thin Fen)	sdMb	MSxv	SH		5	30	
GM058	93099-167	MR/TM	10/8/97		1	185	7	B	dep.	CC	none	vp		Fibrisol			fibrimor	Ob	MSxv	WS		3	2
GM059	93099-063	MR/TM	10/8/97		25	120	2		LS	CV	FIR	w			60	Hemimor	sdMj	MSxv	LK		open 5 or 6	12	
GM060	93099-063	MR/TM	10/8/97		45	180 - 248	-2		LS	CV							Ox/r	MSxv	LK		2	none	
GM061	93099-061	MR/TM	10/8/97		5	8	6	C?	LE	ST	none	vp		Fibrisol			fibrimor	Ob	MSxv	SG		2	
GM062	93099-061	MR/TM	10/8/97				7	B	LV	ST	FIR	w	SL	?	>60	Hemimor?	Mb	MSxv	WS		open 6	5	
GM063	93099-169	MR/TM	10/8/97				7	A	flat	ST	FIR	w-r		Regosol				D	MSxv	BF		3b	0
GM064	93100-171	MR/TM	11/8/97		0	999	7	C	dep.	ST		imp-p	SiCL		>60	mormoder	M	SBPSxc	WS		6	10	
GM064a	93100-169	MR/TM	10/8/97				8	A-B	dep.	ST		r		Regosol	100	none	aCb	MSxv	BF			0	
GM065	93100-171	MR/TM	11/8/97		0	999	8	C/D	valley floor	ST	FIR?	imp	????			mormoder	Mb?	SBPSxc	BF		5 or 6	8	
GM066	93100-169	MR/TM	11/8/97		2	156	6 or 8	B	valley floor	CC		m	SiL		5	Hemimor	Mb	SBPSxc	DS		3b/4	5	
GM067	93100-169	MR/TM	11/8/97		65	205	2	C	LW	ST	none	vp		Fibrisol			Fibrimor	eO	SBPSxc	KG		3a	
GM068	93100-169	MR/TM	11/8/97		0	999	6 or 8	B-C	valley floor	ST		vp		Fibrisol	0	Fibrimorm Post 2/3	O	SBPSxc	WS		2	na	
GM069	93100-169	MR/TM	11/8/97				7 or 8	C	valley floor	ST	FIR?	w	L		20	none	Mk	SBPSxc	WS		3	1	
GM070	93100-169	MR/TM	11/8/97		15	20	3	B-C	LW	ST	none	vp		?		Fibrimor	Ov	SBPSxc	DT		3a		
GM071	93100-169	MR/TM	11/8/97		45	172	2	B	LW	CV	FIR	w	SL		15	not developed	Mv?/Rp/RP	SBPSxc	KG		5	10	
GM072	93100-169	MR/TM	11/8/97		0	999	6 or 7	B/C	valley floor	ST	FIR	m-w	SL?	Br. G.L.	80	Hemimor	sdMp	SBPSxc	WS		5-Apr	10	
GM073	93100-169	MR/TM	11/8/97		10	177	6	C	LS	ST	FIR & WIN	w	SL		5	Hemimor	Mjora	SBPSxc	WM		6	10	
GM074	93106-009	MR/TM	12/8/97		2	78	6	D	valley floor	ST	BIO-b							MSxv	WM		3	0	
GM075	93106-007	MR/TM	12/8/97		3	204	8	E?	valley floor	ST	FIR							MSxv	BF		5	35	
GM076	93106-007	MR/TM	12/8/97				6	B	valley floor	ST		r		L.R.		none		MSxv	BF		5		

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GM077	93106-007	MR/TM	12/8/97		10	175	2	A	ridge	CV		r	CSL		70		xDv	MSxv	LK		2	0
GM078	93106-007	MR/TM	12/8/97				6	E?	valley floor	ST		p	L	HG	15%-70%	SD	Ohv/Mbj	MSxv	WM		3a	0
GM079	93106-007	MR/TM	12/8/97				7	E?	valley floor	ST		p		O.HG		HL		MSxv	BF		3a	0
GM080	93106-009	MR/TM	12/8/97		50	195	2	B	LS	CV		r		O.DyB		HR	gkFg	SBPSxc	KG		5	30
GM081	93106-009	MR/TM	12/8/97				6		dep.	ST	FIR & WAT-I							MSxv	BF		6 or 5	
GM082	93106-009	MR/TM	12/8/97				6		valley floor	ST	BIO-d							MSxv	BF		2	
GM083	93101-179	MR/TM	12/8/97		0	999	8	D	dep.	ST	FIR & CAT-d							MSxv	BF		6/(7)	
GM084	93101-179	MR/TM	12/8/97				6 or 7	D	dep.	CC	?							MSxv	BF		3b	
GM086	93101-179	MR/TM	12/8/97				7	D	valley floor	ST	*****							MSxv	WS		3b/6	
GM087	93101-177	MR/TM	13/8/97				7	C	mid. slp.	ST								SBPSxc	BF		5	10
GM088	93101-177	MR/TM	13/8/97		3	229	6		valley floor	ST								SBPSxc	WS		5	15
GM090	93101-177	MR/TM	8/1/97		0	999	6 or 8	B/C	valley floor	ST	FIR	w	SL				Mb	SBPSxc	WM		4	35
GM092	93101-177	MR/TM	14/8/97		0	999	7	B	toe	ST		w			>60	humimor	Mj?	SBPSxc	BF		3a	
GM093	93101-075	MR/TM	14/8/97				8+		dep.	CC								SBPSxc	BF/SW		4	
GM094	93101-075	MR	14/8/97				7	B	dep.	ST								SBPSxc	BF		5	
GM095	93100-171	MR	14/8/97		10	170	5		LW	CC								SBPSxc	WM		4	
GM096	93100-171	MR	14/8/97		2	333	6	B	LW	ST		w			>60	early hemimor	z?Mu?	SBPSxc	WS		3b	
GM098	93100-171	MR	14/8/97		2	245	6	B	LW	ST		p					O?	MSxv	WS		3a/2	
GM099	93100-171	MR/TM	14/8/97				6 or 7		LW	ST								MSxv	WM		4	
GM100	93100-171	MR	14/8/97		0	999	6		mid slp.	ST								SBPSxc	WS			
H003	93100-171	HR/DA	23/07/97	1415	0	999	7		DP	ST								SBPSxc	WS			
H004	93100-171	HR/DA	23/07/97	1435	0	999	3	B	LV	ST								SBPSxc	LK			
H005	93098-163	HR/DA	23/07/97	1495	0	999	7	B-C	DP	CV						humimor		SBPSxc	BF		3a	
H015	93098-163	HR/DA	23/07/97	1440	0	999	5	C	LV	ST								SBPSxc	SB		2	
H022	93099-061	HR/JW	24/07/97	1640	5	275	4	C	MD	ST		l						MSxv	LT		5-open	8
H024	93099-061	HR/JW	24/07/97	1570	10	275	4	D	MD	ST								MSxv	SC		2	
H027	93099-061	HR/JW	24/07/97	1520	0	999	5		LV	ST								SBPSxc	WM		4	30
H045	93101-181	HR/JW	25/07/97	1550	10	120	2	D	CR	CV								MSxv	GK		2	

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H051	93106-008	HR/JW	25/07/97	1535	50	185	1 or 2	D	MD	ST	cattle							MSxv	KG		2	
H054	93106-008	HR/JW	25/07/97	1560	0	999	2	C	UP	ST								MSxv	GK		2	
H074	93100-067	HR/DA	26/07/97	1500	0	999	2 or 3	A-B	LV	CV	FIR	r	SL	Re. Br.	80	Hem.(po rly develop ed)	sdDp	MSxv	LG		3b	
H076	93100-067	HR/DA	26/07/97	1570	3	180	5	B	MD	LV		r						MSxv	LG			
H085	93101-177	HR/JW	27/07/97	1470	3	80	3	D	MD	ST		i					Ov	SBPSxc	LK		2	
H109	93100-171	HR/DA	28/07/97	1475	0	999	7		DP	ST								MSxv	SH		3a	
J001	93100-171	JT/JW	22/07/97	1540	1	999	3	E	MD?	ST	trampling							MSxv	LG		2	
J003	93100-170	JT/JW	22/07/97	1515	1	999	6	E	LV	ST	BIO-d							MSxv	WS		2	
J013	93099-063	JT/JW	23/07/97	1490	0	999	5	C		ST	FIR							MSxv	SC		2	
J019	93099-062	JT/JW	23/07/97	1455	0	999	6	C	LV	ST	FIR & erosion							SBPSxc	GL		3b	
J023	93100-173	JT/DA	24/07/97	1770	0	999	4	B	TO	ST	FIR							MSxv	LG		2	
J035	93100-173	JT/DA	24/07/97	1550	0-10	999	1 or 2		CR	CV								MSxv	GK		3a/2	
J040	93101-179	JT/DA	25/07/97	1545	10	170	2 or 3	D	UP/LW	ST								MSxv	GK		2	
J048	93101-179	JT/DA	25/07/97	1490	1	999	7 or 8	D	TO	ST								SBPSxc	WS		2	
J049	93106-011	JT/DA	25/07/97	1595	1	180	1 or 2	C	CR/UP	ST								MSxv	LK		2	
J049a	93106-011	JT/DA	25/07/97	25	340	2	D	UP	ST									MSxv	GK		3a	
J069	93100-169	JT/JW	26/07/97	1545	26	60	2 or 3	A-B	MD	CV		r	LS	Brunis ol (ODB)	80	Hemimo r	sgkmMa	SBPSxc	GK*		4	25
J076	93101-077	JT/JW	26/07/97	1460	0	999	4	C	LV	ST	FIR	m	L	Dy. Br.	35	Hemimo r	gdMu	SBPSxc	LG*		6	10
J102	93101-077	JT/JW	28/07/97	1465	23	100	4		LW	ST								SBPSxc	LK		5 or 4	
K5-024	93101-077	HKP	24/8/95	1540	2	90	0		CR	ST	FIR							SBPSxc	BL		5 or 6	
K5-035	93106-009	HKP	26/8/95	1570	6	175	3	C	MD	ST								MSxv	LG		2	
K5-055	93100-169	HKP	29/8/95	1450	1	999	8		DP	ST								SBPSxc	BF			
VD004	93101-175	HR	21/10/98	1320	40	240	3	C	LW			r	sandy				FG	SBPSxc	LK	w	4B	50
VD005	93101-175	HR/TT	21/10/98	1300	0	999	6	C	DP		B.d. (heavy)	p			<20%		c?b	SBPSxc	GL		2b	
VD006	93101-175	HR	21/10/98	1320	30	240	3	B	LW									SBPSxc	LC	w	4	35
VD007	93101-175	HR	21/10/98	50	220	2	B	MD			B.d. (heavy)	r	sandy					SBPSxc	KG	w	2b	
VD008	93101-175	HR/TT/DM	21/10/98	1305	10		3	C									FGh	SBPSxc	LK		5	15

Plot No.	Photo #	Surveyors	Date	Elev.	Slope	Aspect	SMR	SNR	Slope Pos.	Surface shape	Disturbance	Drainage	Soil Texture	Soil Class	Coarse Frag. %	Humus Form	Terrain	BEC Unit	Site Series	Site Modifier	Structural Stage	Crown Closure
VD011	93101-175	HR	21/10/98															SBPSxc	KG		2b	
VD012	93101-175	HR	21/10/98															SBPSxc	KG		2b	
VD013	96101-175	HR	21/10/98	1325	0	999												SBPSxc	GB		1	
VD015		HR/GR/DM	22/10/98	1600					UP			v					Rs	SBPSxc	CL	z	1a	
VD017	93101-	HR/GR/DM	22/10/98	1480	60	200	2	B										SBPSxc	LC	w	5	15
VD018	93101-	HR/GR/DM	22/10/98	1460														SBPSxc	LC	w	6	15
VD019	93101-	HR/GR/DM	22/10/98	1390	65	220			MD			w					Cv	SBPSxc	KG	w	2b	
VD020	93101-	HR/GR/DM	22/10/98	1400	65	220	2-3	B-C									Cvb	SBPSxc	LK	w	4B	80
VD022	93101-	HR	22/10/98		0	999											FGm	SBPSxc	LK		6	20
VD023	93101-	HR	22/10/98	1300	0	999					B.d. (heavy)						FG	SBPSxc	DT		2b	
VD024	94008-027	HR/DM	22/10/98	1625			1	B	CR			w		D.GL	>70%	none	cFGm	MSxc	4	k	3b	
VD026	94008-027	HR	22/10/98		0	999	2	B			B.w. (moose)	m					Mp	MSxv	3		3b	
VH007	93098-163	HR/DA	23/07/97	1500			2	C			FIR							SBPSxc	LC		6(2)	
VH009	93098-163	HR/DA	23/07/97	1505	0	999	4 or 5	C			FIR							SBPSxc	SB		2/3a	
VH010	93098-163	HR/DA	23/07/97		0	999	1 or 2	D	CR		FIR							SBPSxc	LC		2	
VH011	93098-163	HR/DA	23/07/97		0	999	2 or 3	A			colluvium movment							SBPSxc	LK		1b	
VH012	93098-163	DA/HR	23/07/97		0	999	2 or 3	B	LV		infrequent erosion							SBPSxc	LK		3b/2	
VH016	93098-163	HR/DA	23/07/97	1465	12	5	2	B	UP		FIR							SBPSxc	LK		6	
VH017	93098-163	HR/DA	23/07/97	1490	5	270	2	B	LV		none							SBPSxc	LC		3a	
VH018	93098-164	HR/DA	23/07/97						E									SBPSxc	BF		2	
VH019	93008-163	HR/DA	23/07/97	1495	0	999	2 or 3	C	LW		FIR							SBPSxc	LG+		6	
VH023	93099-061	HR/JW	24/07/97	1620	18	280	3	D	MD		FIR							MSxv	LG		6	10
VH025	93099-061	HR/JW	24/07/97	1540			3 or 4	D										MSxv	LT		3a/2	
VH026	93099-061	HR/JW	24/07/97	1530	0	999	5	B			FIR							SBPSxc	GL		2 or 6	10
VH028	93099-168	HR/JW	24/07/97	1520	5	90	3	B	LW		FIR							MSxv	LG		4	10
VH029	93099-168	HR/JW	24/07/97	1520			7	D										MSxv	BF		5	10
VH030	93099-168	HR/JW	24/07/97	1520			5	D										MSxv	GL		2	0
VH032	93099-168	HR/JW	24/07/97	1560			5	D	DP									MSxv	SG		2	

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VH033	93099-168	HR/JW	24/07/97	1550	3	275	2 or 3	D	UP									MSxv	LG		3a	
VH034	93099-168	HR/JW	24/07/97	1530	10	90	2 or 3	E	MD-LW									MSxv	LG			
VH035	93099-168	HR/JW	24/07/97	1530			4	D										MSxv	SG		2	
VH036	93099-168	HR	24/07/97	1530			7	D										MSxv	BF		3a/3b	<1
VH037	93099-168	HR	24/07/97	1530			7	C		FIR								MSxv	BF		2	
VH038	93099-168	HR	24/07/97	1540	0		7			cattle								MSxv	WM		2/3a	
VH040	93101-181	HR/JW	25/07/97	1560		999	7	D	LV									MSxv	BF		3a	
VH041	93101-181	HR/JW	25/07/97	1560	10	240	4 or 5	E	MD									MSxv	LG		2	
VH042	93101-181	HR/JW	25/07/97	1625	10	270	2	D	UP									MSxv	GK		2	
VH043	93101-181	HR/JW	25/07/97	1590	0	999	5	D	LV									MSxv	SC		2	
VH044	93101-181	HR/JW	25/07/97	1555	8	245	3	C	MD									MSxv	LG		3a	
VH046	93101-181	HR/JW	25/07/97	1580	0	999	7	D	LV									MSxv	BF		3a	
VH047	93101-181	HR/JW	25/07/97	1560	10	90	2	D	UP									MSxv	LK		3a	
VH049	93106-008	HR/JW	25/07/97				7	C										MSxv	BF		3a	2
VH050	93106-008	HR/JW	25/07/97					D										MSxv	BF		2	<1
VH052	93106-008	HR/JW	25/07/97	1580	0	999	3	D	LV			p		Fibrisol	0	Fibrimor	Ob?	MSxv	LG		3a	..
VH053	93106-008	HR/JW	25/07/97	1525	2	260	3	C	MD			w	SCL?	Br.G.L.?	10	Hemimor	gdMbj	MSxv	LG		7	30
VH055	93106-008	HR/JW	25/07/97	1570	0	999	3	D				p		Fibrisol	0	Fibrimor	Ob?	MSxv	LG		2	..
VH056	93106-008	HR/JW	25/07/97	1530		180	3	B	LV	FIR		p	Sic(?)	gleysol	80	Leptomoder	kcMbj	MSxv	DT/RR		5	30
VH057	93106-008	HR/JW	25/07/97					B				w	CL	Br.G.L.	60	hemimor	sgMvj	MSxv	LG		6	10
VH058	93106-008	HR/JW	25/07/97	1530				C	LV	FIR		w	CL	Br.G.L.	80	hemimor	gMvj	MSxv	WM		6	9
VH059	93106-008	HR/JW	25/07/97					D/E		Bio-w*		i	L	Hu.Re.Gle.	95	hemimor	kbMb	MSxv	spruce		3a	0
VH060	93106-008	HR/JW	25/07/97					B		FIR		r	SiL	Br.G.L.	21	hemimor	zMvj	MSxv	spruce		6	20
VH061	93106-008	HR/JW	25/07/97					B		Soil creep		r	SiL	Br.G.L.	80	none	Mv	MSxv	spruce		2	0.5
VH062	93106-008	HR/JW	25/07/97	1535			3	B	MD	FIR		w	SiL	Br.G.L.	82		Mvj	MSxv	LG		5	10
VH063	93106-008	HR/JW	25/07/97	1560	0	999	7	B	DP	FIR		w	SL	Br.G.L.	70	hemimor	Mvj	MSxv	WS		4 or 5	55
VH065	93100-067	HR/DA	26/07/97		0	999	7	C	DP	FIR		w	LS/S	Brunisol	70 over 85	Not dev. (hemimor)		MSxv	WS		4	30
VH066	93100-	HR/DA	26/07/97					B				r	CL	EB	5%-30%		sEv/gDv	MSxv	GK		2	0

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	067																					
VH067	93100-067	HR/DA	26/07/97					C			FIR-a	M	CSL	DyB	0	HR	gMb	MSxv	GK/LG		4	40
VH069	93100-067	HR/DA	26/07/97	1500				D			SOI-e	V		Humisol?	0	SD	hOb/skFt	MSxv	GK		2	0
VH070	93100-067	HR/DA	26/07/97	1500			7	B	DP			w					spMv	MSxv	BF		4	60
VH072	93100-067	HR/DA	26/07/97	1550	0	999	7	B	DP									MSxv	BF		6 or 7	40
VH073	93100-067	HR/DA	26/07/97	1550				B				w					dMxh	MSxv	LK		3b	
VH075a	93101-177	HR/DA	27/07/97	1435	0	999	6	B	DP			r	Si				Mvj	SBPSxc	WM		6	15
VH076a	93101-177	HR/JW	27/07/97	1445			3	D	LV									SBPSxc	LK		2	
VH076b	93101-177	HR/JW	27/07/97	1475														SBPSxc	LK		2	
VH077	93100-067	HR/DA	26/07/97	1605	5	195	3	B	MD			w					gMvh	MSxv	LG		4	30
VH078	93100-067	HR/DA	26/07/97	1615	5		6	B				w					gMvh	MSxv	SG		4	
VH078a	93101-177	HR/JW	27/07/97		0	999	7	B	DP			w					Mvj	SBPSxc	BF		5 or 6	15
VH079	93100-067	HR/DA	26/07/97	1610			2	B	CR			w					Mvh	MSxv	GK		4	40
VH079a	93101-177	HR	27/07/97	1490		240		B-C	LV			w					Mvj	SBPSxc	LK		4	20
VH080*	93100-067	HR	26/07/97	1535			3	B										MSxv	LG		4	
VH080a	93101-177	HR/JW	27/07/97	1440				C										SBPSxc	LK		5	15
VH081*	93100-067	HR/DA	26/07/97	1535	0	999	7		DP									MSxv	BF			
VH081a	93101-177	HR/JW	27/07/97	1490				C	LW			w						SBPSxc	LK		2	0
VH082	93100-067	HR	26/07/97	1585	0	999	4	B				w					Mvh	MSxv	LT		4 or 5	25
VH082a	93101-177	HR/JW	27/07/97	1490			7											SBPSxc	BF		4	
VH083	93101-177	HR/JW	27/07/97	1490			7		DP									SBPSxc	WS/BF		3a	0
VH084	93101-177	HR/JW	27/07/97	1495	5	60	2		CR									SBPSxc	LC		6	
VH086	93101-177	HR/JW	27/07/97		0	999	7		DP									SBPSxc	WS		6	
VH087	93101-177	HR/JW	27/07/97	1450		280			LV									SBPSxc	LK/LC		6	
VH088	93101-177	HR/JW	27/07/97	1450	0	999	7	B	DP			w						SBPSxc	WS		4	20
VH089	93101-177	HR/JW	27/07/97	1445		290	3	D	LV			j					Ovj	SBPSxc	LK		3a	
VH090	93101-177	HR/JW	27/07/97	1450			7	D	LV			i					Ov	SBPSxc	WS/BF		2	
VH091	93101-177	HR/JW	27/07/97	1455														SBPSxc	LK/LC		6	
VH092	93101-177	HR/JW	27/07/97															SBPSxc	WS		6	
VH094	93101-177	HR/JW	27/07/97	1455	10	180						m	SIL		80		kczMx	SBPSxc	LK		5 or 6	

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	177		97																			
VH100	93100-171	HR/DA	28/07/97	1470					DP									SBPSxc	WS		3a	
VH101	93100-171	HR/DA	28/07/97	1470								w					Mvj	SBPSxc	LK		5	
VH102	93100-171	HR/DA	28/07/97				7	C or D				l						SBPSxc	WS		3a	
VH103	93100-171	HR/DA	28/07/97	1470														SBPSxc	LK		4	
VH104	93100-171	HR/DA	28/07/97	1470	5	260	2 or 3	B									Mvh	SBPSxc	LK		5	15
VH105	93100-171	HR/DA	28/07/97															SBPSxc	LK		4	25
VH106	93100-171	HR/DA	28/07/97															SBPSxc	WS		3a	
VH108	93100-171	HR	28/07/97	1460													hMv	SBPSxc	LK		4	
VH111	93100-171	HR/DA	28/07/97	1455	0	999	2	B	CR			w					Mvju	SBPSxc	LK		4	20
VH112	93100-171	HR/DA	28/07/97	1450														SBPSxc	LK		5	20
VJ011	93098-161	JT/JW	23/07/97	1490	0	999	3	D	LV									MSxv	LG		3a	
VJ018	93099-062	JT/DA	24/07/97	1490				D										MSxv	WS		2	
VJ026	93100-173	JT/DA	24/07/97	1705				C		cattle								MSxv	WH		2	
VJ027	93100-173	JT/DA	24/07/97					C		cattle								MSxv	BF		2	
VJ032	93100-173	JT/DA	24/07/97	1600	4	160		D	MD									MSxv	SC		2	
VJ033	93100-173	JT/DA	24/07/97	1585	18	220		D	MD									MSxv	SC		3a	
VJ037	93101-076	JT/DA	24/07/97					D		cattle								MSxv	SG		3a	
VJ038	93101-076	JT/DA	24/07/97	1520				D										MSxv	LG		2	
VJ042	93101-179	JT/JW	25/07/97		0	999		C		WIN		p	SiC	Or. G.	10	Hemimor	cMbj	MSxv	GK		7	20
VJ043	93101-179	JT/JW	25/07/97					C		FIR & WIN		w	SL	Br. G.L.	85	hemimor	gMvj	MSxv	BF		5	20
VJ044	93101-179	JT/JW	25/07/97		0	999		E		NONE		i		Mesisol		Mesimor	Ov	MSxv	WS		6	12
VJ045	93101-179	JT/JW	25/07/97					B	CR	FIR		w	SL	Brunisol	80	hemimor	sdMb ?	MSxv	GK		4	40
VJ045a	93101-179	JT/JW	25/07/97					B		FIR		p		fibrisol		fibrimor	Ob	MSxv	GK		3	
VJ059	93100-167	JT/JW	26/07/97	1545			2 or 3	C	CR/LV			w					Mvj	SBPSxc	LC		4	30
VJ060	93100-167	JT/JW	26/07/97	1540			4	B	LV			m					Mvj	SBPSxc	LK		4	
VJ061	93100-167	JT/JW	26/07/97	1535			4	D	LV			w					KbMvj	SBPSxc	LK		2	
VJ062	93100-167	JT/JW	26/07/97	1535	0	999	7	B	LV			w					Mvj	SBPSxc	BF		6	20
VJ064	93100-169	JT/JW	26/07/97	1555	0	200	7	D	LV			i					Ov	SBPSxc	WS		2	
VJ065	93100-169	JT/JW	26/07/97	1555	0	999	6 or 7	D	LV									SBPSxc	WS		2	

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	169		97				7																
VJ066	93100-169	JT/JW	26/07/97	1560				D									gkfj	SBPSxc	LC		6	15	
VJ067	93100-169	JT/JW	26/07/97	1560				B				w					Mvj	SBPSxc	LC		6	15	
VJ071	93100-169	JT/JW	26/07/97	1485	30	35-40	4	B	MD									SBPSxc	LG*		6	30	
VJ074	93101-077	JT/JW	26/07/97	1440				D	LW									SBPSxc	LG*		6 or 7	15	
VJ077	93101-077	JT/JW	26/07/97					D										SBPSxc	GK*		2		
VJ078	93101-077	JT/DA	27/07/97	1450	0	999	5	D	TO									SBPSxc	SB		2		
VJ079	93101-077	JT/DA	27/07/97	1460	0	999		D	LV			l					Ovj	SBPSxc	LK		2		
VJ080	93101-077	JT/DA	27/07/97		0	999	7		DP								zgMxj	SBPSxc	BF				
VJ081	93101-077	JT/DA	27/07/97					C				p					Ov	SBPSxc	WM		3a		
VJ082	93101-077	JT/DA	27/07/97									w						SBPSxc	KG		5	20	
VJ084	93101-077	JT/DA	27/07/97				1 or 2		CR									SBPSxc	KG		5	25	
VJ085	93101-077	JT/DA	27/07/97	1465			5	C	DP									SBPSxc	WM		4		
VJ086	93101-075	JT/DA	27/07/97	1470	0-40	varies	2	D	CR-LW			p						SBPSxc	LC		3a		
VJ087	93101-075	JT/DA	27/07/97					D				l					Ov	SBPSxc	WM		2		
VJ087a	93101-075	JT/DA	27/07/97	1480	10	200	3	B	M									SBPSxc	WM		4		
VJ089	93100-075	JT/DA	27/07/97															SBPSxc	LK		5 or 6	10	
VJ090	93101-075	JT/DA	27/07/97	1490	8	200	2	B	LW									SBPSxc	LK		4	25	
VJ091	93101-075	JT/DA	28/07/97					B									sdMD	SBPSxc	LK		4		
VJ091a	93101-075	JT/DA	27/07/97	1490	0	999	3		LV									SBPSxc	LK		5		
VJ092	93101-077	JT/DA	27/07/97	1490	0	999	6	C or D	DP								Ovj	SBPSxc	WS		2 or 3a		
VJ093	93101-075	JT/DA	28/07/97															SBPSxc	LK				
VJ093a	93101-075	JT/DA	28/07/97						CR									SBPSxc	KG		2		
VJ094	93101-075	JT/DA	27/07/97		0	999	8		LV	ST								SBPSxc	OW/BF/WS		4		
VJ096	93101-075	JT/DA	27/07/97		0	999	7	B	LV	ST								SBPSxc	BF		5	30	
VJ097	93101-075	JT/DA	27/07/97		0	999	8	C	LV	ST							Ov	SBPSxc	WS		2		
VJ098	93101-075	JT/DA	27/07/97		0	999	3	D	LV	ST								SBPSxc	LK		3a		
VJ099	93101-075	JT/DA	27/07/97		0	999	6	D	LV	ST		r						SBPSxc	BF		3b or 5	59	
VJ100	93101-075	JT/DA	27/07/97		0	999	9	C or D	LV	ST		i					Ov	MSxv	SW/OW		3a		

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VJ101	93101-075	JT/DA	27/07/97	1505	5	180	2 or 3		CR-UP			w						MSxv	LG		5	20
VJ103	93101-077	JT/JW	28/07/97	1450		180												SBPSxc	WM/BF		2	
VJ104	93101-077	JT/JW	28/07/97	1445		110			LV									SBPSxc	LK		5	20
VJ105	93101-077	JT/JW	28/07/97	1440	LV													SBPSxc	LK		6	
VJ106	93101-077	JT/JW	28/07/97	1450	0	999	(?)-4		LV									SBPSxc	LK			
VJ108	93100-169	JT/JW	28/07/97	1450	0	999	5		TO									SBPSxc	DS		4	
VJ109	93100-169	JT/JW	28/07/97						LW	ST								SBPSxc	LK/SB/WM/RP		6	
VJ110	93100-169	JT/JW	28/07/97	1435			2		LV									SBPSxc	LK/LC		2	
VJ111	93100-169	JT/HR	28/07/97	1450	10		5		LW									SBPSxc	WM		3a	0
VJ112	93100-169	JT/HR	28/07/97	1450	0	999	7		DP			r-w				none		SBPSxc	BF			
VJ114	93099-063	JT/HR	28/07/97	1565	10	70	4 or 5		LW/M D									MSxv	LG			
VJ115	93101-075	JT/HR	28/07/97		0	999	6 or 7	B	DP									MSxv	WS		4	5
VJ117	93101-078	JT/HR	28/07/97	1550	0	999	6	B-C	DP			m	SL		YES			SBPSxc	SB		4 or 5	5
VJ118	93101-078	JT/JR	28/07/97		0	999	7	B-C	LV	ST			SIL		60			SBPSxc	BF		5	10
VJ119	93101-078	JT/HR	28/07/97	1550				C				vp					O	SBPSxc	LK		2	
VJ119	93101-078	HR/JT	28/07/97					C										SBPSxc	LK		3a	0
VJ120	93101-078	JT/HR	28/07/97	1550			3	B				p						SBPSxc	LK		2 w 3a	
VK002	93101-175	KB/GR	21/10/98	1320			4	C	TO								Ff	SBPSxc	LK		5B	60-80
VK003	94008-032	KB/GR	21/10/98	1440	15	208											(-N)	SBPSxc	KG		2d	
VK006	94008-032	KB/GR	21/10/98	1370					LV									SBPSxc	LK		3bC dense	
VK007	94008-032	KB/GR	21/10/98	1355	0	999			LV			p						SBPSxc	WS		3a	
VK008	94008-032	KB/GR	21/10/98		<5	999			LV									SBPSxc				
VK010	94008-032	KB/GR	21/10/98		0	999			DP									SBPSxc	LA			
VK011	93101-079	KB/TT	22/10/98															SBPSxc	KG		2d	
VK014	93101-079	KB/TT	22/10/98		0-30				MD			w	SL		35-70%		skFGa	SBPSxc	LK	c	5i	
VK015	93101-081	KB	22/10/98			50+	222										skpFGs	SBPSxc	KG		2d	
VK016	93101-081	KB/TT	22/10/98	1285	0	999				F.							FGt	SBPSxc	LK		3bC	
VK017	93101-081	KB/TT	22/10/98						LV	F.		w					FGt	SBPSxc	LK		5i	
VK018	93101-081	KB	22/10/98				5	B	LV			i					Ft	SBPSxc	SF		5	

Plot No.	Photo #	Surveyors	Date	Elev.	Slope	Aspect	SMR	SNR	Slope Pos.	Surface shape	Disturbance	Drainage	Soil Texture	Soil Class	Coarse Frag.%	Humus Form	Terrain	BEC Unit	Site Series	Site Modifier	Structural Stage	Crown Closure
VK-13	93101-079	KB/TT	22/10/98	1365	gentle				LW				SiL		<20%			SBPSxc	LK		5C	
VM050	93089-161	MR/TM	9/8/97					D	dep.			l		O		fibrisol	Ovj	MSxv	BF		2	1
VM051	93098-160	MR/TM	9/8/97		10	295		D	LS	ST	FIR	p	SiL		90	humimor	zgMxj	SBPSxc	LK		2 or 6	10
VM052	93099-063	MR/TM	9/8/97		2	132		C	FI	ST	FIR	p	SiC	gleysol	95	Humimor	cgMxj	SBPSxc	WS		6	25
VM053	93099-063	MR/TM	9/8/97		20	190		C	LS	CV	FIR	w		Br. G.L.	30	Hemimor	Mvm	SBPSxc	LC		5	12
VM054	93099-063	MR/TM	9/8/97		20	190		C	LS	CV		i		fibrisol		fibrimor	Ovjw	SBPSxc	LC		3a	0
VM089	93101-177	MR/TM	13/8/97		10 to 40	180-252	2		LW	CV		w					Mh	SBPSxc	KG			
VM091	93101-177	MR/TM	14/8/97		20-35	188	2	D	LW	ST								SBPSxc	KG			
VR001	93100-071	JT/GR	27/5/97		0	999		D	TO	ST								SBPSxc	WS		2	
VR004	93100-071	JT/GR	27/5/97		0	999			LV	ST								SBPSxc	LK		3a	
VR006	93100-071	JT/GR	27/5/97		0	999			LV	ST								SBPSxc	SH		5	
VR007	93100-071	JT/GR	27/5/97		0	999			LV	ST								SBPSxc	floodplain			
VR008	93100-071	JT/GR	27/5/97															SBPSxc	LK			
VR010	93100-069	JT/GR	27/5/97		60	235				ST								SBPSxc	LC		5	
VR013	93100-069	JT/GR	27/5/97						UP	ST	FIR							SBPSxc	LC			
VR014	93100-069	JT/GR	27/5/97		0	999			DP ???	ST								MSxv	WS		5	
VR015	93100-069	JT/GR	27/5/97	1485														MSxv	LG			
VR017	93100-069	JT/GR	27/5/97	1480	15	220	2		UP	ST								SBPSxc	LK		2	
VR018	93100-169	JT/GR	27/5/97					B	LW	ST								SBPSxc	DT		4	
VR019	93100-169	JT/GR	27/5/97								cattle							SBPSxc	DS			
VR020	93100-169	JT/GR	27/5/97															SBPSxc	WS			
VR021	93100-169	JT/GR	27/5/97															SBPSxc	BF			
VR022a	93100-169	JT/GR	27/5/97															SBPSxc	DT			
VR022b	93100-169	JT/GR	27/5/97															SBPSxc	WM			
VR022c	93100-169	JT/GR	27/5/97															SBPSxc	BF			
VR024	93101-077	JT/GR	27/5/97															SBPSxc	WS			
VR025	93101-077	JT/GR	27/5/97															SBPSxc	BF			
VR026	93101-077	JT/GR	27/5/97															SBPSxc	LK			
VR027	93039-168	JT/GR	28/5/97															MSxv	LG			

Plot No.	Photo #	Surveyors	Date	Elev.	Slope	Aspect	SMR	SNR	Slope Pos.	Surface shape	Disturbance	Drainage	Soil Texture	Soil Class	Coarse Frag.%	Humus Form	Terrain	BEC Unit	Site Series	Site Modifier	Structural Stage	Crown Closure
VR027a	93039-168	JT/GR	28/5/97															MSxv	WS		5	
VR029a	93099-062	JT/GR	28/5/97															SBPSxc	WM			
VR029b	93099-062	JT/GR	28/5/97															SBPSxc	WM			
VR029c	93099-062	JT/GR	28/5/97															SBPSxc	BF			
VR030a	93099-062	JT/GR	28/5/97															SBPSxc	SB			
VR030b	93099-062	JT/GR	28/5/97	1525														SBPSxc	LK		5	65
VR036	93101-076	JT/GR	28/5/97															SBPSxc	KG		6	50
VR036a	93101-076	JT/GR	28/5/97	1475	5	200												SBPSxc	LK			
VR042	94008-031	JT/GR	28/5/97															MSxv	BL			
VR045	93101-077	JT/GR	28/5/97															SBPSxc	GL			
VR048	93101-077	JT/GR	28/5/97	1470	5		3											SBPSxc	LK			
VR049	93101-077	JT/GR	28/5/97					B										SBPSxc	LK		6	
VR051	93101-077	JT/GR	28/5/97															SBPSxc	SB		6	15
VR052	93101-077	JT/GR	28/5/97		<5													SBPSxc	LK		6	
VR053	93101-077	JT/GR	28/5/97															SBPSxc	LK/SB/WM		5	
VR054	93101-077	JT/GR	28/5/97															SBPSxc	KG			
VR055	93101-077	JT/GR	28/5/97															SBPSxc	LK		4 or 5	
VR056	93101-079	JT/GR	28/5/97															SBPSxc	BF			
VR057	93101-079	JT/GR	28/5/97						CR									SBPSxc	LC			
VR058	93101-079	JT/GR	28/5/97															SBPSxc	BF		6	



Appendix 10

MINE SITE STUDY AREA POLYGON DATABASE - DIGITAL FORM

Insert one page



Appendix 11
MINE SITE: ECOSYSTEM DESCRIPTIONS

Ecosystem Descriptions

Descriptions are presented by zone and then within each zone are categorized as forested or shrub and herb dominated units. Sparsely vegetated, non-vegetated and anthropogenic units for the whole study area are then described. All plant species identified in the study area are listed by their common and scientific names in Appendix 13.

Table 1:**Ecosystems of the study area**

*Prefix denotes project specific ecosystem

*Suffix denotes MSxv site series mapped within the SBPSxc

SBPS xc - Sub-Boreal Pine-Spruce, Very Dry, Cold Subzone								
Forested Ecosystems								
Ecosystem Label	Site Series and Wetland Codes	Structural Stage	Number of Plots	Assumed Modifier	Typical Conditions	Terrain	Typical Moisture Regime	Mapped Modifiers
GK*	taken from the MSxv 04 PI – Grouseberry – Kinnickinnick	4-5	1 detailed 1 ground 1 visual	d, j, m	gentle slope; deep medium-textured soil	till	submesic	k
LK	01 PI – Kinnickinnick – Feathermoss	3-7	5 detailed 22 grounds 60 visuals	d, j, m	gentle slope; deep, medium-textured soils	till blanket	mesic	c, k, s, w
LC	02 PI – Kinnickinnick – Cladonia	3-6	1 detailed 12 grounds 22 visuals	c, d, j	gentle slope; deep, coarse-textured soils	thin till veneer over bedrock (02c) or till blanket (02a); fluvio-glacial kames and eskers	submesic to subxeric	h, k, r, s, t, v, w
LG*	taken from MSxv 01 PI – Grouseberry – Feathermoss	4-6	3 grounds 3 visuals	d, j, m	gentle slope; deep, medium-textured soil	till blankets, fluvio-glacial terrace	mesic	k
*PR	00 Balsam poplar – Prickly rose	5-6	1 ground 1 visual	a,c,j,	gentle slope; active floodplain, coarse deposits	fluvial	subhygric	-
SB	03 Sxw – Scrub birch – Fen moss	4-7	1 detailed 2 grounds 6 visuals	d, j, m	gentle slope, lower slope receiving site; deep medium-textured soils	till blanket	subhygric	-

Table 1 (Cont'd): Ecosystems of the study area

*Prefix denotes project specific ecosystem *Suffix denotes MSxv site series mapped within the SBPSxc

SBPS xc - Sub-Boreal Pine-Spruce, Very Dry, Cold Subzone								
Forested Ecosystems								
Ecosystem Label	Site Series and Wetland Codes	Structural Stage	Number of Plots	Assumed Modifier	Typical Conditions	Terrain	Typical Moisture Regime	Mapped Modifiers
SF	04 Sxw – Scrub birch – Feathermoss	4-7	2 grounds 1 visual	j, m	gentle slope, lower or toe slope position; receiving site; medium-textured soils	till blanket	subhygric	
SG*	taken from MSxv 07 Sxw – Crowberry – Glow moss	5-6	1 visual	d, m	lower slope to toe position, receiving seepage; deep, medium-textured soils, cool sites	till blanket	subhygric	-
SH	05 Sxw – Horsetail – Glow moss	4-7	2 grounds 1 visual	j, m	gentle slope, lower or toe slope position; receiving site; medium-textured soils	till blanket	subhygric to hygric	-
SM	06 Sxw – Horsetail – Meadowrue	3-6	2 grounds	d, j, m	depressional areas; deep, medium-textured soils	fluvial	hygric to subhygric	-
*ST	00 Spruce – Black twinberry	5-6	1 detailed 2 grounds 1 visual	a, c, j	active floodplain; sandy soils	fluvial	subhygric	
Shrub and Herb Dominated								
BF	W12 Beaked sedge fen	2	2 detailed 11 grounds 20 visuals	p	depressions; imperfect to poor drainage	organic blanket or veneer	subhydric to hydric	-
*BL	00 Bluebunch wheatgrass-Lichens	2	1 detailed 4 grounds 1 visual	j, v	crest position; very shallow soils on weathered basalt	weathered basalt	very xeric to sub xeric	-

Table 1 (Cont'd): Ecosystems of the study area

*Prefix denotes project specific ecosystem *Suffix denotes MSxv site series mapped within the SBPSxc

SBPS xc - Sub-Boreal Pine-Spruce, Very Dry, Cold Subzone								
Shrub and Herb Dominated								
Ecosystem Label	Site Series and Wetland Codes	Structural Stage	Number of Plots	Assumed Modifier	Typical Conditions	Terrain	Typical Moisture Regime	Mapped Modifiers
DS	W7 Drummond's willow – Sedge swamp	3b	1 detailed 1 ground 1 visual	a	level to very gently sloping in toe positions; imperfect drainage but flooding occurs; limited to streamside locations	fluvial	hygic to hydric	-
*DT	00 Dandelion – Timber oat-grass	2	2 grounds 1 visual		anthropogenic unit; herbaceous meadows heavily degraded by cattle; flat to gently sloping on lower slopes	fluvial	mesic	-
*GL	00 Grass – Large-leaved avens	2	1 detailed 2 visuals		Level; deep, fine-textured, gleyed soils on fluvial deposit	fluvial	subhygic to hygic	-
*KG	00 Kinnickinnick – Grass	2	1 detailed 18 grounds 15 visuals		crests and upper warm aspect slopes; deep, medium textured soil.	fluvioglacial eskers and kames, moraine	subxeric	r, w
*SW	00 Rocky-Mountain cowlily – water smartweed	2	1 ground		parts of shallow lakes where vegetation cover is >10%	organic/shallow water	hydric	-
WM	W5 (includes some W4) Grey-leaved willow –Moss shrub carr	3a	13 grounds 11 visuals	-	gentle, level, lower slopes on any aspect; imperfect to poor drainage; medium to coarse textured soils	organic veneer over fluvial	subhygic to hygic	w

Table 1 (Cont'd): Ecosystems of the study area

*Prefix denotes project specific ecosystem *Suffix denotes MSxv site series mapped within the SBPSxc

SBPS xc - Sub-Boreal Pine-Spruce, Very Dry, Cold Subzone								
Herbaceous and Shrub Ecosystems								
Ecosystem Label	Site Series and Wetland Codes	Structural Stage	Number of Plots	Assumed Modifier	Typical Conditions	Terrain	Typical Moisture Regime	Mapped Modifiers
WS	W8 Bog willow – Sedge low shrub fen	3a	2 detailed 18 grounds 24 visuals	p	depressions; slopes negligible; poor to very poor drainage with surface always wet; deep organic soils	organic blanket	subhydic	-
MSxv - Montane Spruce, Very Cold, Very Dry Subzone								
Forested Ecosystems								
LG	01 PI – Grouseberry – Feathermoss	3-7	4 detailed 12 grounds 19 visuals	d, j, m	gentle slope; deep, medium-textured soil	till blankets, fluvioglacial terrace	mesic	h, k, s, w
LK	03 PI – Kinnickinnick – Cladonia	3-6	1 detailed 6 grounds 4 visuals	j, m, r, s	gentle slope; crest position; shallow soil over bedrock; medium-textured soils	rock with till or colluvial veneers	xeric to subxeric	c, v, w
GK	04 PI – Grouseberry – Kinnickinnick	4-7	4 detailed 3 grounds 7 visuals	d, j, m	gentle slope; deep, medium-textured soil	till	submesic	h, k, r, s, w
LT	05 PI – Trapper's tea – Crowberry	3-6	1 detailed 2 visuals	d, j, m	gentle slope; deep, medium-textured soils; cool sites	till blanket	mesic	-
SC	06 Sxw – Crowberry – Knight's plume	3-7	1 detailed 1 ground 2 visuals	j	gentle lower slope, receiving site	till blanket	subhydic	-

Table 1 (Cont'd): Ecosystems of the study area

*Prefix denotes project specific ecosystem *Suffix denotes MSxv site series mapped within the SBPSxc

MSxv - Montane Spruce, Very Cold, Very Dry Subzone								
Forested Ecosystems								
Ecosystem Label	Site Series and Wetland Codes	Structural Stage	Number of Plots	Assumed Modifier	Typical Conditions	Terrain	Typical Moisture Regime	Mapped Modifiers
SG	07 Sxw – Crowberry – Glow moss	3-7	5 grounds 5 visuals	d, m	lower slope to toe position, receiving seepage; deep, medium-textured soils, cool sites	till blanket	subhygric	-
SH	08 Sxw – Horsetail – Crowberry	3-7	1 detailed 1 ground	d, j, m	toe slope to depression; deep medium-textured soil, high water table	till blanket	hygric to subhydric	-
Shrub and Herb Dominated								
BF	W12 Beaked sedge fen	2	1 detailed 11 grounds 16 visuals	p	depressions; imperfect to poor drainage	organic blanket or veneer	subhydric to hydric	-
*BL	00 Bluebunch wheatgrass – Lichen	2	1 visual	j, v	crest position; very shallow soil on weathered basalt	weathered basalt	very xeric to sub-xeric	-
DS	W7 Drummond's willow – Sedge swamp	3b	-	a	level to very gently sloping in toe positions; imperfect drainage but flooding occurs; limited to streamside locations	fluvial	hygric to hydric	-
*DT	00 Dandelion – Timber oat-grass	2	1 visual	-	anthropogenic unit; herbaceous meadows heavily degraded by cattle grazing; flat to gently sloping on lower slopes	fluvial	mesic	-

Table 1 (Cont'd): Ecosystems of the study area

*Prefix denotes project specific ecosystem *Suffix denotes MSxv site series mapped within the SBPSxc

MSxv - Montane Spruce, Very Cold, Very Dry Subzone								
Herbaceous and Shrub Ecosystems								
Ecosystem Label	Site Series and Wetland Codes	Structural Stage	Number of Plots	Assumed Modifier	Typical Conditions	Terrain	Typical Moisture Regime	Mapped Modifiers
*GL	00 Grass – Large-leaved avens		1 visual	d, f	level; deep, fine-textured, gleyed soils on fluvial deposits		subhygric to hygric	-
*KG	00 Kinnickinnick – Grass	2	1 detailed 1 ground 1 visual	d, m	crests and upper warm aspect slopes; deep, medium textured soil	fluvioglacial eskers and kames, moraine	subxeric	w
*SW	00 Rocky-Mountain cowlily - water smartweed	2	-		parts of shallow lakes where vegetation cover is >10%	organic/shallow water	hydric	-
*WH	00 Willow – Horsetail	3a	1 ground 1 visual	j, p	lower slope, abundant seepage; organic veneers over till deposits	till blanket	hygric	-
WM	W5 (includes some W4) Grey-leaved willow – Moss shrub carr	3a	1 ground 2 visual	-	gentle, level, lower slopes on any aspect; imperfect to poor drainage; medium textured soils	organic veneer over fluvial	subhygric to hygric	-
WS	W8 Bog willow – Sedge low shrub fen	3a	1 detailed 8 grounds 7 visuals	p	depressions; slopes negligible; poor to very poor drainage with surface always wet; deep organic soils	organic blanket	subhydric	-

Table 1 (Cont'd): Ecosystems of the study area

*Prefix denotes project specific ecosystem

*Suffix denotes MSxv site series mapped within the SBPSxc

MSxv - Montane Spruce, Very Cold, Very Dry Subzone								
Non-Vegetated, Sparsely Vegetated, and Anthropogenic Units of the SBPS and MS								
Ecosystem Label	Site Series and Wetland Codes	Structural Stage	Number of Plots	Assumed Modifier	Typical Conditions	Terrain	Typical Moisture Regime	Mapped Modifiers
CL	Cliff	1	1 ground 1 visual					z
ES	Exposed Soil	1						w
GB	Gravel Bar	1	1 visual					-
LA	Lake		1 visual					-
OW	Shallow Open Water		3 visuals					-
RO	Rock Outcrop	1						w
RP	Road							w
RR	Rural	1	1 visual					-
TA	Talus	1	2 grounds					k, w
UR	Urban	1	1 visual					-

Forested Site Series Of The SBPSxc Subzone
GK***LC 02 PI-Kinnikinnick-Cladonia**

Distribution: This site series includes all forested sites that are drier than average. The typical phase is limited to steep south and southwest facing slopes and crest positions where soils are deep. Slopes are gentle in crest positions while gradients can reach 70% on warm aspect upper slopes. Surficial materials are morainal in origin. Soils are rapidly to well drained with a sandy loam texture. There is little humus development. A shallow phase occurs where soils are less than 50 cms deep over bedrock. These usually occur in crest or upper slope positions.

Vegetation Description: The steep, south facing slopes have a significantly different plant composition than the gentle sloping crest positions. These pine stands are usually very open in mature stands but can have a dense canopy of up to 60% in the young pole-sapling stage. More than 85% of the plots completed are in structural stage 5 and younger. Fire has been the main source of disturbance. There are very scattered occurrences of subalpine fir and spruce in the shrub layers of some of these stands. Shrub cover of common juniper, prickly rose and soopolallie is quite sparse, but juniper may be more common than in the mesic sites. Herbs are scattered and are the same as in the mesic sites (see LK below) although cover of kinnikinnick is greater, while that of pinegrass is generally less. A lack of moss in the bryophyte layer indicates the drier conditions of these submesic ecosystems. Cladonias and pelt lichens are particularly abundant, while reindeer and Stererocaulon species are more scattered.

One stand of Douglas fir is located on the slopes of Onion Hill above the Taseko River, north of Fish Creek. The trees are mature and form a very open canopy, beneath which are grasses and herbs as described above. However there are no aspen or pine saplings in the stand.

LCw3: On steep warm slopes where fire has been a frequent source of disturbance and a tree canopy is lacking, the flora is significantly different to that described above. Aspen is often dominant in the shrub layer, with scattered pine, prickly rose and soopolallie. Rocky mountain juniper, Saskatoon berry and wolf willow also occur on these warm slopes. Grasses are the most noticeable ground cover, except in the shallow phase. Bluebunch wheatgrass, pinegrass, and purple reedgrass may all be locally abundant. Flowering herbs can be diverse but cover is very low. These include kinnikinnick, northern bedstraw, yarrow, nodding onion, pussy toes, cut-leaved anemone, spreading dogbane, draba, spike-like goldenrod, small-flowered penstemmon, shrubby penstemmon, pasture sage and daisy.

LG***LK 01 PI-Kinnikinnick-Feathermoss**

Distribution: These forests occur throughout the area on gentle, mid to lower slopes of all aspects. The surficial material is a till blanket or veneer. Soils are well to moderately drained Brunisolic Grey Luvisols or Orthic Dystric Brunisols with a silt loam texture and varying amounts of coarse fragments that can reach 85%. A hemimor humus type is usual.

Vegetation Description: Most of the mesic stands in the study area are young forests, reflecting the strong influence of fire in the area. Consequently, over 75% of the plots

completed in this site series were of structural stages 4 or 5, that is pole sapling or young forest stands. However, species composition does not appear to change significantly from young forests to older forests, and crown closure tends to be rather open in all seral stages.

Forests are usually dominated by lodgepole pine but minor amounts of hybrid spruce, and in the younger stands, trembling aspen occur. Pure stands of trembling aspen occur along the Taseko River valley. Crown closure is often only about 15% but increases to 40 or 50% in some stands. Pine regenerates well in the understory and is often the most abundant species in the shrub layer. Spruce and subalpine fir are scattered. Low shrubs are not usually abundant but always include common juniper, soopolallie, prickly rose and sometimes willow. Pinegrass and kinnikinnick are the most abundant ground cover. Pinegrass is always present either as patches or as a lush swath with up to 50% cover beneath the rather open tree canopy. Flowering herbs are always present but are not particularly diverse. Heart-leaved arnica, twinflower, fireweed, wild strawberry, yarrow and kinnikinnick commonly occur. Bryophytes are common but lichens are more abundant and diverse than mosses. *Cladonia* and *Cladina* species are dominant. *Peltigera* and *Stereocaulon* are more scattered. Red-stemmed feather moss and *Dicranum* species are rather sparse.

PR 00 Balsam poplar -Prickly rose

Distribution: These balsam poplar stands occur along the active floodplain of the Taseko River and the fluvial fan of Fish Creek. The gently sloping to level units are well drained on coarse fluvial material.

Vegetation Description: Stands are mixed but tall balsam poplars dominate. Trembling aspen, spruce and pine beneath combine to form a tree cover of 20-25 %. Mountain alder, prickly rose and willow dominate the shrubs, with some aspen, spruce and pine regeneration in the shrub layer. Black gooseberry, soopolallie, common juniper, and red raspberry may be scattered as low shrubs. Herbs are diverse and almost entirely cover the ground. They include bluejoint, leafy aster, wintergreen, wild strawberry, one-sided wintergreen and other wintergreen species. There are probably at least another 30 herbaceous species also present, while mosses are almost entirely absent. In grazed sites dandelion, grasses and wild strawberry are abundant.

SG***SB 03 Sxw-Scrub birch-Fen moss**

Distribution: These ecosystems develop in lower slope and toe positions where soil conditions are moister than average. They are on level to very gentle slopes adjacent to shrubby or herbaceous wetlands. Drainage is imperfect to poor and gleysols have developed as a result. The surficial material is morainal or fluvio-glacial and soils have a high coarse fragment content but a silt clay texture.

Vegetation Description: Spruce forms the tree canopy in the older stands of this site series while pine is more common in the young stands. Disturbance has been caused by fire. There is little regeneration of tree species in the understory but scrub birch and Bebb's willow form quite a dense shrub layer. Common juniper, prickly rose and soopolallie, typical of more mesic sites, are present in small amounts. Herbs are quite varied but are not abundant. Northern bedstraw, wild strawberry, fireweed, yarrow, meadowrue, paintbrush, twinflower, nagoonberry, cut-leaved anemone, showy aster, kinnikinnick and coltsfoot are scattered. Glow moss is abundant while *Dicranum* species and pelt lichens are sparse.

SF 04 Sxw-Scrub birch-Feathermoss

Distribution: These ecosystems develop on gentle lower slopes where drainage is moderate to imperfect. Soils are loamy and the humus is a humimor. Surficial material is morainal or fluvial.

Vegetation Description: Spruce forms the main canopy and is also abundant in the understory. Pine and subalpine fir are minor components, both in the tree canopy and as regeneration. Shrubs are sparse and include soopolallie, rose, black twinberry, green alder and common juniper. Herbs are diverse and include sarsparilla, pinegrass, twinflower, palmate coltsfoot, asters, one-sided wintergreen and pink wintergreen. Red-stemmed feathermoss is the most common bryophyte.

SH 05 Sxw-Horsetail-Glow moss

Distribution: These moist sites are very limited within the study area. They occur in depressional areas where the water table is at or close to the surface. Slightly drier hummocks alternate with wet depressions in the sites observed.

Vegetation Description: These moist ecosystems have a very open canopy of spruce with a dense layer of green alder beneath. Other shrubs, including black twinberry, prickly rose and black gooseberry, are sparse. Herbs are lush and indicative of moist conditions. Common horsetail, sedges and grasses dominate. Other herbs include aster, kidney-leaved violet, small bedstraw, and dandelion. The bryophyte layer includes leafy mosses and palm moss but it is not well developed.

SM 06 Sxw-Horsetail-Meadowrue

Distribution: These ecosystems occur as narrow bands of forest in wet sites adjacent to stream channels or in moist depressions. Seepage water is almost continuous and the soils are nutrient rich.

Vegetation Description: Spruce, balsam poplar and lodgepole pine all occur in the main tree canopy, which has a 15% cover. At the one site observed in the field, trembling aspen

occurs in the understorey. Shrubs are sparse but include black twinberry, high-bush cranberry, rose and soopolallie. Herbs are abundant and lush, with a 30% cover of meadowrue. Baneberry, common horsetail, star-flowered false solomon's seal and cowparsnip are common. Other herbs include arctic lupine, bracted lousewort, northern bedstraw and trailing raspberry.

ST 00 Spruce- twinberry

Distribution: This ecosystem occurs on floodplain deposits along the Taseko River. They occur on regularly flooded sites where cumulic regosols have developed. Soil texture is sandy.

Vegetation Description: Spruce forms the main tree canopy but there is a minor component of balsam poplar and lodgepole pine. Mountain alder (*Alnus tenuifolia*) is scattered in the tall shrub layer throughout, while the lower shrub layer is better developed and includes black twinberry, prickly rose, and common juniper. Leafy and showy asters and bluejoint are abundant, while common horsetail, wintergreen species, one-sided wintergreen, single delight, wild strawberry and bunchberry are all present. Bryophytes are diverse and their cover is variable. They include knight's plume, red-stemmed feathermoss, electrified cat's tail, and stepmoss.

Forested Ecosystems Of The Montane Spruce MSxv Subzone

GK 04 PI-Grouseberry- Kinnikinnick

Distribution: These submesic ecosystems mainly occur on convex crest and upper slope positions, which are rapidly to well-drained. Gradient varies from level to 10% and aspect is varied. Soils have developed on deep morainal or fluvio-glacial material and are brunisolic grey luvisols or orthic dystic brunisols. Texture varies from a silty to sandy loam with a coarse fragment content that varies from 20 to 80%.

Vegetation Description: These submesic forests have crown closure of pine of less than 30%. Subalpine fir, spruce and pine all occur in the shrub layer. The usual shrubs, common juniper, soopolallie and prickly rose, are patchy. Mature forests have quite a diverse herb layer with kinnikinnick being dominant. Twinflower, fireweed, heart-leaved arnica, and bunchberry all occur. *Cladonia*, freckled lichen and *Dicranum* dominate the bryophyte layer. Crown closure and species composition does not change significantly in the younger stands.

LG 01 PI-Grouseberry-Feathermoss

Distribution: Mesic ecosystems occur on flat to gentle gradients on all aspects of upper to lower morainal slopes. Soils have a silty to sandy loam texture with varying percentages of coarse fragments. They are well to moderately well-drained with hemimor or humimor humus types at the surface. Brunisolic grey luvisols are the most common soils.

Vegetation Description: Mature mesic forests are dominated by white spruce and only have a minor component of pine and subalpine fir. Crown closure varies from 20 to 40%. Spruce and fir are also in the shrub layer. Common juniper, prickly rose and soopolallie are always present as scattered low shrubs. Black twinberry and willow can also be present. The herb layer in these mature, mesic forests is varied and lush. Twinflower and grouseberry are often abundant, while others such as pinegrass, wild strawberry, fireweed, heart-leaved arnica and showy aster are always present. Bunchberry, bracted lousewort, one-sided

wintergreen, kinnikinnick, meadowrue, arctic lupine, columbine, northern bedstraw, yarrow and sweet coltsfoot may occur, and in some sites are abundant. Bryophytes in these mature forests form a carpet. Red-stemmed feathermoss and *Dicranum* are most common but glow moss and step moss can be locally abundant. *Cladonia* species and pelt lichens are not as plentiful as mosses.

Younger stands are dominated by pine but the understory tree species include pine, spruce and subalpine fir. Crown closure may be slightly higher than in the older stands but remains less than 50%. Shrubs are sparse and similar to the mature forests. Herbs are somewhat less lush and varied but the species remain the same. The bryophyte layer is dominated by red-stemmed feathermoss and *Dicranum* species, but freckled lichen, *Cladonia* species and dog lichen are significant, and there is often a very sparse cover of *Stereocaulon*.

LK 03b PI-Kinnikinnick-Cladonia (shallow phase)

Distribution: These sites are limited to areas of shallow soils over bedrock, such as on the summits of Tete Hill and Cone Hill, and along the bedrock ridge to the south west of Fish Lake. Slopes range from level to moderately steep, with a neutral to warm aspect. They are convex, upper slope and crest positions where drainage is rapid to well-drained. Soils have developed on weathered bedrock or thin morainal veneers. There is no humus development, coarse fragment content is greater than 30%, and soil texture is a silty to sandy loam. Regosols, regosolic brunisols and brunisolic grey luvisols occur on these sites.

Vegetation Description: These very open dry sites usually only have pine in the tree canopy which has crown closure of less than 15%. Common juniper and soopolallie form the scattered low shrub layer, and prickly rose can occur but is very sparse. Kinnikinnick and pine grass have significant cover, while other species are less consistent and sparse. These may include lance-leaved stonecrop, twinflower, Rocky Mountain butterweed and timber milk vetch. Crustose lichens dominate the bryophyte layer, while mosses are absent. At least 30% of the ground is not vegetated, but is covered by rocks and mineral soil.

In younger stands isolated trembling aspen occurs and saskatoon berry and Rocky mountain juniper are scattered.

LT 05 PI-Trapper's tea-Crowberry

Distribution: These ecosystems have been identified on midslope positions where the gradient is level to 5%. Aspect is westerly. Soils are similar to mesic LG sites.

Vegetation Description: Pine dominates the open tree canopy in mature sites while spruce is very minor. Trapper's tea is abundant in the shrub layer together with pine regeneration. Other shrubs are scattered and include black twinberry, prickly rose, soopolallie, willow, common juniper and white rhododendron. The herb layer is varied but grouseberry crowberry and twinflower are most abundant. Others include bunchberry, bracted lousewort, fireweed, yarrow, mountain heather, northwestern sedge and showy aster. The bryophyte layer is well developed and is dominated by red-stemmed feathermoss, curly heron's bill moss, *Cladonia* species, and freckled lichen. Younger stands have a denser tree canopy of up to 35%. The abundance of trapper's tea is less but the species present are similar, if somewhat reduced in diversity.

SC 06 Sxw-Crowberry-Knight's plume

Distribution: These moist ecosystems occur on level to gentle gradients in the mid to lower slope position on generally warm aspects of morainal deposits. They develop in the moister depressions on the gentle slopes. Soils are often similar to those on mesic sites and are orthic luvisols as well as brunisolic grey luvisols.

Vegetation Description: Spruce dominates the mature, open tree canopy. Willow and black twinberry are common in the shrub layer. Subalpine fir is present as regeneration. Herbs reflecting the moister conditions of this ecosystem include sweet coltsfoot, common horsetail, and meadowrue. Other more ubiquitous species include twinflower, bracted lousewort, northern bedstraw, arctic lupine, yarrow, bunchberry, wild strawberry, heart-leaved arnica, fireweed, and pine grass. Mosses such as glow moss, heron's bill moss and red-stemmed feathermoss dominate the bryophyte layer. Pelt lichens and reindeer lichens are scattered. Younger stands have pine in the tree canopy mixed with spruce. Other species are similar to mature stands.

SG 07 Sxw-Crowberry-Glowmoss

Distribution: These ecosystems are on level to gently sloping sites usually adjacent to wetlands; drainage is imperfect to poor. Soils are gleysols with a high coarse fragment content in a sandy to silty-clay loam matrix.

Vegetation Description: Mature stands have an open canopy of spruce with scattered pine trees. The understorey regeneration is spruce with isolated sub-alpine fir. Scrub birch and willows dominate the shrub layer that can also include scattered black twinberry, soopolallie, common juniper and Labrador tea. Herbs are similar to the SC ecosystems but sweet coltsfoot and common horsetail are more abundant, while grouseberry and crowberry are rather sparse. Mosses form a thick carpet with glow moss dominant and heron's bill moss being common. Lichens are sparse, but include reindeer and pelt lichen.

SH 08/09 Sxw -Horsetail-Crowberry/ Sxw-Labrador tea-Willow

Distribution: These ecosystems occur on level to depressional sites where organic material have accumulated. Drainage is poor and mesisols have developed. Mesimor humus forms occur. They occur adjacent to willow wetlands and are transitional from wetland to closed forest.

Vegetation Description: These very open canopy spruce stands do not fit the description of either site series very well, but occur in the hygic position on the edatopic grid. They have a shrub layer of willow with minor components of scrub birch, black twinberry, prickly rose and Labrador tea. Common horsetail and sedges separate this ecosystem from slightly drier ones. Other herbs include bluejoint, slimstem reedgrass (*Calamagrostis stricta*), sweet coltsfoot, mitrewort, fireweed, Nagoonberry, twinflower, grass of parnassus, Sitka burnet, and rein orchid (*Platanthera obtusata*). Mosses are abundant and are dominated by sphagnum, glow moss and leafy mosses.

Shrub And Herb Dominated Ecosystems Of The SBPSxc**BF W12 Beaked sedge fen**

Distribution: These herbaceous fens occur in level depressions where organic blankets have built up. The deposits are fibrisols with fibrimor humus development or mesisols. Drainage is imperfect to very poor and the soil moisture of these sites varies both spatially and seasonally.

Vegetation Description: These sedge wetlands are often extremely homogenous. Beaked sedge with water sedge form continuous cover, often up to 80%. Bluejoint and slimstem reedgrass are scattered throughout. Shrubs are very sparse, having less than 5% cover. They are low and hidden by the sedges, and include grey-leaved and Barclay's willows and scrub birch. Sickie moss may form a cover of up to 20% but moss cover is often not well developed.

BL 00 Bluebunch Wheatgrass-lichens

Distribution: These ecosystems have developed on weathered basalt outcrops where soil development is minimal. The sites are xeric with rapid drainage from these crest positions. There is no humus development. Soil texture is a sandy clay loam and coarse fragments are often over 50%.

Vegetation Description: Vegetation on these dry basalt outcrops often covers less than 50% of the ground. Bluebunch wheatgrass is consistently present, although cover is low. Flowering herbs are sparse and include cut-leaf daisy, rosy, field and Nuttall's pussytoes, and saxifrage. Compact selaginella also occurs. Lichens are the dominant vegetation. *Cladonia* species can be common while crustose lichens and rusty steppe moss are scattered.

DS W7 Drummond's Willow Sedge swamp

Distribution: These ecosystems are limited to streamside locations on fluvial deposits. The sites are level to very gently sloping in toe positions. Drainage is imperfect and flooding occurs; soils are regosols. Rich nutrient conditions are reflected in mull humus forms.

Vegetation Description: Tall shrubs of Drummond's, grey-leaved and tea-leaved willows separate these wetlands from other shrub fens identified. Isolated pine and spruce saplings may occur. Black twinberry, black gooseberry and scrub birch will be scattered as low shrubs. Herbs vary in species from site to site but can include leafy aster, field mint, Sitka burnet, meadowrue, violets, fireweed and large-leaved avens. Beaked and water sedge can also be common. The moss layer is poorly developed or absent.

DT 00 Dandelion-Timber oatgrass

Distribution: These sites occur along roads or adjacent to buildings where cattle use has been prolonged. They are flat to gently sloping in a lower slope position but the defining factor is cattle use rather than the physical variables.

Vegetation Description: These mesic to moist herbaceous meadows have been degraded by cattle grazing. Dandelions are always present but the ecosystem is dominated by a variety of grasses. These include timber oat grass, brome, and wheeler's bluegrass. Yarrow and field chickweed are usually quite common.

GL 00 Grass- Large-leaved avens

Distribution: These meadows are limited to mineral soils adjacent to small creeks. They develop on fine textured clay loam fluvial deposits with no coarse fragments. Drainage is imperfect to poor and soils are gleyed. Humus forms are mesimors.

Vegetation Description: These are moist meadows along creeks dominated by a variety of grasses. These include timothy, wheatgrass, Kentucky bluegrass, and several other species. Wild strawberry (*Fragaria virginiana* ssp. *glauca*), fireweed, Sitka burnet, sheep sorrel, western dock, small-flowered penstemon, marsh valerian, dandelion and large-leaved avens are all common. In wetter areas sedges increase.

KG 00 Kinnikinnick-Grass

Distribution: These dry ecosystems usually occur on convex crests and warm aspect slopes of the fluvio-glacial kames and eskers that dot the landscape as well as steep warm slopes of morainal deposits that occur adjacent to wetlands. Slopes vary from 5% on crests to up to 65% on the warm aspect slopes. Aspects range from 172 to 252 degrees. Soils are well drained with some coarse fragments but no humus development.

Vegetation Description: Kinnikinnick, covering at least 20% of the ground, is always present on these dry slopes. An average of 25% of the ground surface is unvegetated and consists of bare mineral soil and rocks. Grasses are usually dominant but vary in their composition. Bluebunch and slender wheatgrass are consistently present while pinegrass, junegrass or needlegrass species may also be quite abundant. Common juniper and prickly rose are usually present, as are small shrubby aspen and pine saplings. Creeping juniper, saskatoon and soopolallie are sometimes scattered. Nodding onion is often scattered, while other herbs are sparse but vary from site to site. They may include pussytoes, old man's whiskers, locoweed, showy Jacob's ladder and wild strawberry.

SW 00 Rocky Mountain cow-lily - Water smartweed

Distribution: This ecosystem occurs in parts of shallow lakes where the vegetation cover exceeds 10%. Areas of SW generally merge with open water of the deeper parts of the lakes, and with sedge fens on the landward side.

Vegetation Description: Areas of shallow water have significant vegetation cover dominated by Rocky Mountain cow-lily (spatterdock) and water smartweed with leaves floating on the surface. Other aquatic species include narrow-leaved bur-weed and common spike-rush, but these are scattered.

WM W5 Grey-leaved willow-moss shrub carr

Distribution: Shrub carrs occur in lower slope and level positions on gentle slopes on any aspect. Drainage is imperfect to poor and soils are usually gleysols with an organic veneer. Soils are loams with a high coarse fragment. Humus forms are humimors and hemimors.

Vegetation Description: Grey-leaved willow and scrub birch form a dense shrub layer that is about one to two metres in height. Cover is usually greater than 60%. Other shrubs, such as Barclay's willow and hoary willow may occur but have sparse cover. In some sites black twinberry, prickly rose and short-fruited willow are scattered. The occasional spruce or pine sapling may occur. Beaked sedge and water sedge are usually present but are significantly

less abundant (< 30% cover) than in the sedge wetlands. Other herbaceous species are very diverse, but individual cover is low. Coltsfoot, both arrow-leaved and sweet, occurs most consistently while asters, northern gentian, meadowrue, large-leaved avens, yarrow, wild strawberry, graceful cinquefoil and marsh valerian commonly occur. Moss cover is often rather insignificant with glow moss, followed by fuzzy golden moss, being the most common species. However, in some sites mosses form a thick carpet.

WS W8 Bog willow-sedge low shrub fen

Distribution: Shrub fens occur on organic blankets or veneers in depressional areas. Slopes are negligible, drainage is poor to very poor and the surface is always wet. The organic materials are usually fibrisols with fibrimor humus at the surface.

Vegetation Description: Grey-leaved willow, scrub birch and Barclay's willow are the most common low shrubs in this wetland type. Bog willow itself has not been identified within the study area. Sedges, usually dominated by water and beaked sedges, form a dense cover of greater than 60%. In some sites the shrubs were lower than the sedges while in others they were up to one metre in height and very noticeable. Bluejoint is quite common and scattered herbs may include large-leaved avens, coltsfoot and Sitka burnet, but herb diversity and coverage is much lower than in the shrub carr (WM). There is a thick moss cover dominated by glow, golden fuzzy, and sickle mosses.

In one or two sites mapped as WS, sphagnum mosses were common but other species indicators of bog conditions, such as Labrador tea, western bog-laurel, crowberry and bog cranberry, were either very sparse or lacking. Also, at a few sites spruce is a noticeable but sparse component in the tree and shrub layers. Total tree species cover at these sites is always less than 10% in total. The remaining vegetation is as described above, although sedge coverage is somewhat reduced. These wet, organic sites are not identified as forested site series and are included in the WS.

Shrubs And Herb Dominated Ecosystems Of The MSxv

BF W12 Beaked sedge fen

Distribution: These herbaceous fens occur in level depressions where organic blankets have built up. The deposits are fibrisols with fibrimor humus development. Drainage is imperfect to very poor and the soil moisture of these sites varies both spatially and seasonally.

Vegetation Description: These sedge wetlands are often extremely homogenous. Beaked sedge with water sedge form continuous cover, often up to 80%. Bluejoint is scattered throughout. Shrubs are very sparse, having less than 5% cover. They are low and hidden by the sedges, and include grey-leaved willow and scrub birch. Arrow-leaved coltsfoot is often scattered throughout. Moss cover is not well developed. The centres of the wetlands may be a mix of scouring rush and field sedge.

BL	See SBPSxc for description
DS	See SBPSxc for description
DT	See SBPSxc for description
GL	See SBPSxc for description
KG	See SBPSxc for description

SW See SBPSxc for description

WH 00 Willow-Horsetail

Distribution: These meadows occur on lower slopes where seepage is abundant and drainage is poor. Organic veneers have developed over morainal deposits and humus development is a saprimoder.

Vegetation Description: These are lush moist meadows dominated by low willows and horsetails. Black twinberry is sometimes scattered. Spruce and subalpine fir can also be scattered. Herb cover includes arrow-leaved groundsel, Sitka burnet, scarlet paintbrush, bog orchid, cow-parsnip, wild strawberry, yarrow and common pink winter-green. Grasses are a minor component. Glow moss and leafy mosses are common.

WM See SBPSxc description

WS See SBPSxc description

Sparsely Vegetated/Non Vegetated And Anthropogenic Units

CL Cliff

Distribution: These occur along the westerly facing scarp of the Taseko River valley in the SBPSxc.

Description: A steep, vertical or overhanging rock face. Vegetation is extremely sparse but includes pine, common and creeping junipers, soopolallie, kinnikinnick, and grasses.

GB Gravel bar

Distribution: These occur along the Taseko River in the SBPSxc.

Description: An elongated landform generated by waves and currents and usually running parallel to the shore. It is composed of unconsolidated small round cobbles, pebbles, stones and sand.

ES Exposed Soil

Distribution: These occur on the steep sides of Fish Creek valley and in the Taseko River valley.

Description: Exposed mineral soil on slopes where active erosion is taking place.

LA Lake

Distribution: There are several lakes within the study area. Many are mapped as complexes with shallow open water (OW) or the more vegetated aquatic SW ecosystem.

Description: This is a naturally occurring body of water that is more than 2 metres deep and remains unvegetated throughout the growing season.

OW Shallow open water

Distribution: Many of the lakes in the south of the study area are partially mapped as OW.

Description: This is permanent open water that has less than 10% cover of emergent aquatic plant cover and the water is less than 2 metres in depth.

RO Rock Outcrop

Distribution: These are scattered in the study area.

Description: Rock outcrops are level to steep bedrock surfaces with negligible soil development and less than 10% vascular plant cover.

RP Road Surface

Distribution: These units mainly exist in the vicinity of the proposed pit area.

Description: Areas that have been cleared for the purposes of drilling have been classified here. The definition is an area cleared and compacted for the purposes of transporting goods and services by vehicle. In some locations these sites are revegetating and are now supporting herbaceous communities.

RR Rural

Distribution: These units are limited in the study area to a few sites where summer grazing occurs around old, usually uninhabited residences.

Description: Areas that have residences and outbuildings surrounded by forests and range are mapped as RR.

TA Talus

Description: This is colluvium of large angular rock fragments that have accumulated at the base of steep rock slopes through the action of gravity.

Distribution: Basalt talus slopes occur close to the mine site.

UR Urban

Distribution: This unit is limited to the camp at the minesite in the SBPCxc.

Description: This unit is an almost continuous covering of human residences and developments.



Appendix 12
REVIEW OF POTENTIAL RARE PLANTS
WITHIN THE CHILCOTIN FOREST DISTRICT (#65)

SCIENTIFIC NAME	COMMON NAME	PROV LIST	PROV RANK	GLOBAL RANK	HABITAT/ECOLOGY	IDENTIFYING FEATURES	POTENTIAL FOR OCCURENCE	NOTES
<i>Botrychium ascendens</i>	Upswept Moonwort	Blue	S1?	G3?	No information found			
<i>Botrychium simplex</i>	Least Moonwort	Blue	S1?	G5	vernal pools and ephemeral seepages in the lowland and montane zones	trophophore attachments strongly variable, those with simple blades usually attached high on the leaf, those with lobed, non-ternate leaves in the middle of the leaf, and those with ternate blades near the base of the leaf	2	
<i>Pellaea atropurpurea</i>	Purple Cliff-brake	Blue	S1?	G5	dry to mesic limestone rocks in the montane and subalpine zones	stipes and rachis sparsely pilose, dull; pinnae long-stalked, the basal ones with stalks 5-15mm long; sterile and fertile fronds dissimilar, the fertile exceeding the sterile ones	5	limestone absent from study area
<i>Apocynum medium</i>	Western Dogbane	Blue	S2S3	G5?	Valleys/lower mtns	Lobes acute to acuminate, leaves ascending, calyx gen at least half as long as corolla, pinkish corolla	2	flowers in northern parts of its range from mid to late July
<i>Arabis lemmonii</i> var. <i>drepanoloba</i>	Lemmon's Rockcress	Blue	S1?	G5T?	Mesic Meadows and talus slopes in the alpine zone, as well as meadows and ridges	petals rose-purple; gen pannose with tiny, grayish, freely branched hairs, arising from branched caudex, racemes 3-10 flowered, secund.	4-6	
<i>Arabis lignifera</i>	Woody-Branched Rockcress	Blue	S2S3	G5T5	sagebrush desert	siliques 1-1.5 (rarely 2)mm broad; basal leaves more greenish than grey; petals 6-9 mm, rose-pink to purplish	5-6	

Note: 1 = very high, 2 = high, 3 = moderate, 4 = low, 5 = very low, 6 = nil potential for occurrence

SCIENTIFIC NAME	COMMON NAME	PROV LIST	PROV RANK	GLOBAL RANK	HABITAT/ECOLOGY	IDENTIFYING FEATURES	POTENTIAL FOR OCCURENCE	NOTES
<i>Arnica chamissonis</i> ssp. <i>incana</i>	Meadow Arnica	Blue	S1?	G5	very wet places or in water, tends to grows at lower elevations	herbage conspicuously silvery-tomentose, 5-10 pairs of leaves and a distinctive tufts of hairs on the tips of the involucre bracts; stalked and toothless leaves	5	known only from 7 stations in S BC
<i>Atriplex argentea</i> ssp. <i>argentea</i>	Silvery orache	Red	S1	G5	saline habitats or disturbed sites and fields in steppe vegetation and montane zones	gen strongly lacinate margins and strongly tuberculate-appendaged and greatly hardened sides; radicle superior; plant rounded, not weedy; leaf blades entire or slightly toothed, lanceolate to deltoid-ovate	5, 6	flowers July-August
<i>Camissonia breviflora</i>	Short-Flowered Evening Primrose	Red	SH	G5T?	dry open areas in the lowland zone	plants stemless; leaves in basal rosette, pinnatifid	4, 5	
<i>Castilleja tenuis</i> (<i>Orthocarpus hispidus</i>)	Hairy Owl-Clover	Red	S1	G5	moist meadows and vernal pools in the lowland and steppe vegetation zones	lower lips of corollas more or less trisaccate—corolla white or yellow; bracts green throughout; lower lips of corollas with inconspicuous teeth; calyx 2-cleft with bifid segments	5, 6	
<i>Chenopodium leptophyllum</i> var. <i>oblongifolium</i>	Narrow-Leaved Goosefoot	Red	S2	G5T?	saline or alkaline sites in the steppe vegetation zone	leaves linear to lanceolate, mostly entire, usually white-farinose below	5, 6	
<i>Crepis occidentalis</i> ssp. <i>pumila</i>	Western Hawksbeard	Red	S1	G5T?	dry, open, sandy or gravelly sites in the steppe vegetation zone	involucres without gland-tipped hairs; Deeply lobed leaves with broad, pointed segments and yellowish to brownish achenes	5, 6	

Note: 1 = very high, 2 = high, 3 = moderate, 4 = low, 5 = very low, 6 = nil potential for occurrence

SCIENTIFIC NAME	COMMON NAME	PROV LIST	PROV RANK	GLOBAL RANK	HABITAT/ECOLOGY	IDENTIFYING FEATURES	POTENTIAL FOR OCCURENCE	NOTES
<i>Draba alpina</i>	Alpine Draba	Blue	S1?	G4	dry meadows and rocky slopes in the subalpine zones; snowbeds, scree; strictly a high elevation species	dwarf tufted; branches densely clothed with old, persistent leaves, all basal, hairy on both surfaces; flowers are bright yellow; oval to elliptic silicles, hairy or glabrous	5, 6	
<i>Draba densifolia</i>	Nuttall's Draba	Blue	S1?	G5	mesic to dry openings, meadows, and cliffs from the upper montane to alpine zones	leaves not fleshy, linear to narrowly oblanceolate, midnerve prominent; silicles 2-7x2-3.5mm	5, 6	
<i>Draba glabella</i> var <i>glabella</i>	Smooth Draba	Blue	S1S3	G4G5T4	moist to mesic meadows and cliffs in the subalpine and alpine zones	lowest pedicel shorter than silicle; all of the cruciform and stellate hairs short-stalked; petals white; styles less than 0.5 mm long	5, 6	
<i>Draba ruaxes</i>	Coast Mountain Draba	Blue	S2S3	G2G3	dry meadows and cliffs in the subalpine and alpine zones	upper leaf surfaces with long, simple or once- or twice-forked hairs; stems and pedicels with simple, rarely forked hairs; leaves greater than 2 mm broad	5, 6	
<i>Draba ventosa</i>	Wind River Draba	Blue	S1?	G3	dry meadows and cliffs in the subalpine and alpine zones	silicles oval to ovate, densely and coarsely pubescent with simple and cruciate to stellate hairs	5, 6	

<i>Epilobium ciliatum</i> <i>ssp watsonii</i>	Purple-Leaved Willowherb	Blue	S2S3	G5T?	disturbed places, roadsides, fields and wet areas from the lowland to montane zones	underground turions absent; inflorescences sucorymbose, rhizomes short of lacking, bulb-like buds (offsets) present or absent; leaves opposite and lance-shaped, flowers small (2-8 mm long); fruits are long narrow capsules; plant is 0.5-1.5m tall	2	
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Note: 1 = very high, 2 = high, 3 = moderate, 4 = low, 5 = very low, 6 = nil potential for occurrence

SCIENTIFIC NAME	COMMON NAME	PROV LIST	PROV RANK	GLOBAL RANK	HABITAT/ECOLOGY	IDENTIFYING FEATURES	POTENTIAL FOR OCCURENCE	NOTES
<i>Montia chamissoi</i>	Chamisso's Montia	Blue	S1?	G5	wet places (bogs, marshes, streambanks), montane at middle to lower elevations	perennial plants, rhizomatous and stoloniferous, generally with offsets along stolons and often with some of flowers changed to bulbils	5, 6	
<i>Myosurus minimus</i>	Tiny Mousetail	Blue	S2S3	G5	wet sites in the lowland and steppe vegetation zones	beak of achene rarely greater than 0.5mm; often with .100 achenes; sepals 3(5)-nerved; mature spikes mostly 15-50mm long	5	
<i>Polemonium boreale</i>	Northern Jacob's Ladder	Blue	S2S3	G5	mesic to dry meadows and rock outcrops in the montane to alpine zones	stems 0.8-3dm tall; leaflets distinctly pubescent (at least when young); corolla lobes rounded apically	4	

<i>Polemonium caeruleum</i> ssp. <i>amygdalinum</i>	Tall Ladder Jacob's	Blue	S1?	G?T?	wet to moist swamps and meadows in the montane or subalpine zones	stamens included in the corollas, markedly surpassed by the styles, leaves mainly basal, tufted, divided into 19-27 leaflets, lance shaped to elliptic; flowers pale blue or purplish, bell shaped in loose terminal clusters; petal lobes pointed and with tiny fine hairs along their margins	4	
<i>Polemonium elegans</i>	Elegant Ladder Jacob's	Blue	S2S3	G4	dry cliffs and scree slopes in the alpine zone	plants 0.5-1.5dm tall, stipitate-glandular or glandular-hairy throughout; leaflets opposite or offset, undivided; corolla generally 12-15mm; rounded heads of blue flowers.	5, 6	

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SCIENTIFIC NAME	COMMON NAME	PROV LIST	PROV RANK	GLOBAL RANK	HABITAT/ECOLOGY	IDENTIFYING FEATURES	POTENTIAL FOR OCCURENCE	NOTES
<i>Potentilla diversifoia</i> var. <i>perdissecta</i>	Diverse-Leafed Cinquefoil	Blue	S2S3	G5T4	in the Chilcotin, descends to medium elevations in dry open forest	leaves +/- sericeous to glabrate, greenish; segments linear to oblong, up to 4mm broad; leaves more or less pinnate; leaflets dissected to base, and deeply divided into 5(-7) leaflets; flowers are yellow, showy and petals are notched at tips; tufted plant	3	
<i>Potentilla ovina</i>	Sheep Cinquefoil	Blue	S1?	G4	moist open areas in the montane zone; meadows to ridges and barren slopes	leaflets dissected nearly to the base into narrow linear segments, gray throughout; rarely at all lanate beneath	5, 6	
<i>Potentilla quinquefolia</i>	Five-leafed Cinquefoil	Blue	S2S3	G4	gravelly drainages and slopes in the montane zone	basal leaves in part 5-foliolate, dissected halfway to midrib; pubescence of stems mostly tangled	3	

<i>Ranunculus flabellaris</i>	Yellow Water-Buttercup (Yellow Water-Crowfoot ⁴)	Red	S1	G5	ponds, shorelines and mudflats in the steppe vegetation and montane zones; in arid basins on plateaus	leaves, or at least the submerged ones, 3-5 times ternately dissected into ultimately filiform to narrowly oblong segments less than 2 mm wide; achenes corky-margined; strongly keeled on distal dorsal margin		last collected in 1949
<i>Ranunculus pedatifidus</i>	Birdfoot Buttercup	Blue	S2S3	G5	moist meadows in the montane to alpine zones	basal leaves 5-7 lobed at least half their length; nectary scales not ciliate; achene beaks curved	3	
<i>Senecio plattensis</i>	Plains Butterweed	Blue	S2S3	G5	dry, open montane forests	involucral bracts green throughout or purple in upper half; regular teeth along the edges of at least some basal leaves and is seldom densely woolly	3	found once between Williams Lake and Quesnel

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SCIENTIFIC NAME	COMMON NAME	PROV LIST	PROV RANK	GLOBAL RANK	HABITAT/ECOLOGY	IDENTIFYING FEATURES	POTENTIAL FOR OCCURENCE	NOTES
<i>Carex heleonastes</i>	Hudson Bay Sedge	Blue	S2S3	G4	Bogs and fens in the montane zone	culms very rough below the head; perigynia cinereous or brown in age; the beak reddish brown at apex	3	
<i>Carex hystericina</i>	Porcupine Sedge	Blue	S1?	G5	swamps, shorelines and wet meadows in the steppe and montane zones	teeth of perigynia beaks straight; perigynia suborbicular in cross-section, more or less inflated, membranaceous or submembranaceous; rootstock with long slender horizontal stolons; ligules short, wider than long or about as wide as long; achenes broadly obovate	3	
<i>Carex saximontana</i>	Rocky Mountain Sedge	Blue	S2S3	G5	moist meadows in the montane and subalpine zones	lower pistillate scales leaflike, much longer than the perigynia and even longer than spike	3	

<i>Carex simulata</i>	Short-Beaked Sedge	Blue	S2S3	G5	wet, often calcareous, fens in the montane zone	Perigynia chestnut coloured, unequally biconvex; beak 1/5-1/3 of the body; rootstock slender; lower sheaths light brownish	3	
<i>Carex sychnocephala</i>	Many-Headed Sedge	Blue	S2S3	G4	shorelines and wet to moist meadows in the steppe and montane zones	Perigynia very narrow, 4.8-6.5mm long and 0.8-1.0mm wide, 5-7 times as long as wide; bracts leaf-like, conspicuously exceeding the head	3	
<i>Carex xerantica</i>	Dry-Land Sedge	Blue	S2S3	G5	grassland, open slopes and mountain parks, high plains to spruce-fir zone in mountains	inflorescences stiff, spikes approximate or aggregated; scales silvery throughout; 1 st 2 internodes collectively generally 10-18mm	3	

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SCIENTIFIC NAME	COMMON NAME	PROV LIST	PROV RANK	GLOBAL RANK	HABITAT/ECOLOGY	IDENTIFYING FEATURES	POTENTIAL FOR OCCURENCE	NOTES
<i>Erythronium montanum</i>	White Glacier Lily	Blue	S2S3	G4	moist meadows and open forests in the montane to alpine zones	leaves bright yellow-green, not mottled; flowers white (often drying pinkish), broadly lanceolate, much widened above	5	
<i>Festuca minutiflora</i>	Little Fescue	Blue	S1?	G5	dry, stony slopes in the alpine zone	lowermost lemmas 2.8-3.3mm long; leaf blades with a folded width of 0.2-0.4mm; ovary tops with a few stiff hairs	6	
<i>Juncus albescens</i>	Whitish Rush	Blue	S2S3	G5	wet calcareous fens in the montane zone (Chilcotin Plateau)	Bracts long acuminate or awned, larger than flowers; capsules pale, smaller than or equal to perianth	3	

<i>Melica spectabilis</i>	Purple Oniongrass	Blue	S2S3	G5	wet to dry meadows and open forest in the montane and subalpine zones	Glumes less than ½ the length of the spikelets; corms clustered, not remaining attached to the section of rhizome; Lemmas glabrous or scabrous	3	
<i>Muhlenbergia glomerata</i>	Marsh Muhly	Blue	S2S3	G4	wet to moist meadows, streambanks, bogs, irrigation ditches, lake margins, and hot springs in the steppe and montane zones	internodes dull, puberulent; lemmas pilose along margins and base; ligules less than 0.6mm long; anthers 0.8-1.5mm long; culms branch basally, semiterete; sheaths scarcely keeled	4	

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SCIENTIFIC NAME	COMMON NAME	PROV LIST	PROV RANK	GLOBAL RANK	HABITAT/ECOLOGY	IDENTIFYING FEATURES	POTENTIAL FOR OCCURENCE	NOTES
<i>Scolochloa festuacea</i>	Spangle-Top	Blue	S2S3	G5	Ponds, marshes, lakeshores and streamsides in the steppe and montane zones, generally in standing water (shallow water)	culms up to 1.5m; ligs membranous, 2-6mm, lacerate; blades flat, 5-10mm broad, firm, elongate and narrowed gradually to a slender tip; branches ascending and mostly naked below midlength; 1 st glume 4-6 mm, 3-nerved, 2 nd glume 5-7.5mm, 5-nerved; anthers 3-4mm; tall, stout perennial with creeping rhizomes; leaves flat; inflorescence is spreading, each spikelet has 3-5 florets; lemmas have a tuft of hairs at base;---easy to ID because the whitish colour of the empty heads can be readily identified from a distance. Often forms a tall border around shallow open water.	3	
<i>Trichophorum pumilum</i>	Small Deer-Grass	Blue	S2S3	G5	bogs, lakeshores and wet meadows in the subalpine and alpine zones	Culms cylindrical, smooth; culms rhizomatous; scales awnless or nearly so; spikelets ovate; bristles absent	5, 6	

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Appendix 13

MINE SITE STUDY AREA: TAXONOMIC PLANT LIST

The following list represents the vascular plants and bryophytes that were identified from selected sample sites in the Taseko Mines Site. The list follows the format in Douglas et al. (1989-1994), except that here the Pteridophytes (ferns and allies) follow the Gymnosperms: Common names follow the Provincial vegetation database.

GYMNOSPERMS

CUPRESSACEAE

<i>Juniperus communis</i> L.	Common juniper
<i>Juniperus scopulorum</i> Sarg.	Rocky Mountain juniper

PINACEAE

<i>Abies lasiocarpa</i> (Hook.) Nutt.	Subalpine fir
<i>Picea glauca</i> (Moench) Voss	White spruce
<i>Pinus contorta</i> Dougl. ex Loud.	Lodgepole pine
<i>Pseudotsuga menziesii</i> (Mirb.) Franco	Douglas-fir

PTERIDOPHYTES

EQUISETACEAE

<i>Equisetum arvense</i> L.	Common horsetail
<i>Equisetum fluviatile</i> L. em. Ehrh.	Swamp horsetail
<i>Equisetum laevigatum</i> A. Br.	Smooth scouring-rush
<i>Equisetum pratense</i> Ehrh.	Meadow horsetail
<i>Equisetum scirpoides</i> Michx.	Dwarf scouring-rush
<i>Equisetum sylvaticum</i> L.	Wood horsetail

SELAGINELLACEAE

<i>Selaginella densa</i> Rydb.	Compact selaginella
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DRYOPTERIDACEAE

<i>Cystopteris fragilis</i> (L.) Bernh.	Fragile fern
<i>Woodsia scopulina</i> D.C. Eaton	Mountain cliff fern
<i>Woodsia</i> cf. <i>oregana</i> D.C. Eaton	Western cliff fern

OPHIOGLOSSACEAE

<i>Botrychium</i> cf. <i>lunaria</i> (L.) Sw.	Common moonwort
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ANGIOSPERMS

DICOTYLEDONS

APIACEAE

<i>Heracleum lanatum</i> Michx.	Cow-parsnip
<i>Lomatium</i> cf. <i>dissectum</i> (Nutt.) Math. & Const.	Fern-leaved desert parsley
<i>Osmorhiza chilensis</i> H. & A.	Mountain sweet-cicely

APOCYNACEAE

<i>Apocynum androsaemifolium</i> L.	Spreading dogbane
ASTERACEAE	
<i>Achillea millefolium</i> L.	Yarrow
<i>Agoseris aurantiaca</i> (Hook.) Greene	Orange agoseris
<i>Agoseris glauca</i> (Pursh) Raf.	Short-beaked agoseris
<i>Anaphalis margaritacea</i> (L.) Benth. & Hook. f. ex C.B. Clarke	Pearly everlasting
<i>Antennaria microphylla</i> Rydb.	Rosy pussytoes
<i>Antennaria neglecta</i> Greene	Field pussytoes
<i>Antennaria parviflora</i> Nutt.	Nuttall's pussytoes
<i>Antennaria pulcherrima</i> (Hook.) Greene	Showy pussytoes
<i>Antennaria racemosa</i> Hook.	Racemose pussytoes
<i>Antennaria cf. umbrinella</i> Rydb.	Umber pussytoes
<i>Arnica chamissonis</i> Less.	Meadow arnica
<i>Arnica cordifolia</i> Hook.	Heart-leaved arnica
<i>Arnica latifolia</i> Bong.	Mountain arnica
<i>Arnica fulgens</i> Pursh	Orange arnica
<i>Artemisia campestris</i> L.	Northern wormwood
<i>Artemisia dracunculus</i> L.	Tarragon
<i>Artemisia frigida</i> Willd.	Prairie sagewort
<i>Artemisia ludoviciana</i> Nutt.	Western mugwort
<i>Artemisia</i> sp. (? <i>michauxiana</i>)	unidentified sage
<i>Aster borealis</i> (T. & G.) Prov.	Rush aster
<i>Aster ciliolatus</i> Lindl. in Hook.	Lindley's aster
<i>Aster conspicuus</i> Lindl. in Hook.	Showy aster
<i>Aster sibiricus</i> L.	Arctic aster
<i>Aster</i>	Aster
<i>Cirsium</i>	Thistle .
<i>Crepis</i>	Hawksbeard
<i>Erigeron compositus</i> Nutt.	Cut-leaved daisy
<i>Erigeron speciosus</i> (Lindl.) DC.	Showy daisy
<i>Hieracium albiflorum</i> Hook.	White hawkweed
<i>Petasites frigidus</i> (L.) Fries	Sweet coltsfoot
<i>Petasites sagittatus</i> (Banks ex Pursh) A. Gray	Arrow-leaved coltsfoot
<i>Senecio pauperculus</i> Michx.	Canadian butterweed
<i>Senecio pseud aureus</i> Rydb.	Streambank butterweed
<i>Senecio streptanthiflorus</i>	Rocky Mountain butterweed
<i>Solidago canadensis</i> L.	Canada goldenrod
<i>Solidago multiradiata</i> Ait.	Northern goldenrod
<i>Solidago spathulata</i> DC.	Spike-like goldenrod
<i>Taraxacum officinale</i> Webber in Wiggers	Common dandelion
<i>Tragopogon dubius</i> Scop.	Yellow salsify
?BERBERIDACEAE	
? <i>Mahonia</i>	Oregon-grape
BETULACEAE	

<i>?Alnus crispa</i> (Ait.) Pursh	Green alder
<i>Alnus tenuifolia</i> Nutt.	Mountain alder
<i>Betula glandulosa</i> Michx.	Scrub birch
<i>Betula occidentalis</i> Hook.	Water birch
<i>Betula papyrifera</i> Marsh.	Paper birch
BORAGINACEAE	
<i>Lithospermum ruderale</i> Dougl. ex Lehm.	Lemonweed gromwell
<i>Myosotis</i> sp.	Forget-me-not
BRASSICACEAE	
<i>Arabis drummondii</i> A. Gray	Drummond's rockcress
<i>Arabis holboellii</i> Hornem.	Holboell's rockcress
<i>Cardamine ? pensylvanica</i> Muhl. ex Willd.	Pennsylvanian bittercress
<i>Cardamine occidentale</i> (S. Wats.) Howell	Western bittercress
<i>Draba aurea</i> Vahl. in Horn.	Golden draba
<i>Draba borealis</i> DC.	Northern draba
<i>Draba inserta</i> Pays.	Yellowstone draba
<i>Draba oligosperma</i> Hook.	Few-seeded draba
<i>Draba paysonii</i> Macbr.	Payson's draba
<i>Draba praealta</i> Greene	Tall draba
<i>Erysimum cheiranthoides</i> L.	Wormseed mustard
<i>Rorippa palustris</i> (L.) Bess.	Marsh yellow cress
CAPRIFOLIACEAE	
<i>Linnaea borealis</i> L.	Twinflower
<i>Lonicera involucrata</i> (Richards.) Banks ex. Spring	Black twinberry
<i>Moehringia lateriflora</i> (L.) Fenzl	Blunt-leaved sandwort
<i>Sambucus racemosa</i> L.	Black elderberry
<i>Symphoricarpos albus</i> (L.) Blake	Common snowberry
CARYOPHYLLACEAE	
<i>Cerastium arvense</i> L.	Field chickweed
<i>Minuartia rubella</i> (Wahl.) Hiern	Boreal sandwort
<i>Moehringia lateriflora</i> (L.) Fenzl	Blunt-leaved sandwort
<i>Silene</i>	Campion
<i>Stellaria</i>	Starwort
CERATOPHYLLACEAE	
<i>Ceratophyllum demersum</i> L.	Common hornwort
CHENOPODIACEAE	
CONVOLVULACEAE	
CORNACEAE	

<i>Cornus canadensis</i> L.	Bunchberry
<i>Cornus stolonifera</i> Michx.	Red-osier dogwood
CRASSULACEAE	
<i>Sedum lanceolatum</i> Torr.	Lance-leaved stonecrop
DROSERACEAE	
<i>Drosera angelica</i> Huds.	Great sundew
ELAEAGNACEAE	
<i>Elaeagnus commutata</i> Behr. ex Rydb.	Silverberry
<i>Shepherdia canadensis</i> (L.) Nutt.	Soopolallie
EMPETRACEAE	
<i>Empetrum nigrum</i> L.	Crowberry
ERICACEAE	
<i>Arctostaphylos urva-ursi</i> (L.) Spreng.	Kinnikinnick
? <i>Cassiope</i>	
<i>Kalmia microphylla</i> (Hook.) Heller	Western bog-laurel
<i>Ledum glandulosum</i> Nutt.	Trapper's tea
<i>Ledum groenlandicum</i> Oeder	Labrador tea
<i>Moneses uniflora</i> (L.) Gray	Single delight
<i>Orthilia secunda</i> (L.) House	One-sided wintergreen
<i>Phyllodoce empetriformis</i> (Sw.) D. Don	Pink mountain-heather
<i>Phyllodoce glanduliflora</i> (Hook.) Cov.	Yellow mountain heather
<i>Pyrola asarifolia</i> Michx.	Pink wintergreen
<i>Pyrola chlorantha</i> Sw.	Green wintergreen
<i>Pyrola picta</i> Sm.	White-veined wintergreen
<i>Rhododendron albiflorum</i> Hook.	White-flowered rhododendron
<i>Vaccinium alaskaense</i> Howell	Alaskan blueberry
<i>Vaccinium caespitosum</i> Michx.	Dwarf blueberry
<i>Vaccinium scoparium</i> Leib.	Grouseberry
FABACEAE	
<i>Astragalus americanus</i> (Hook.) M.E. Jones	American milk-vetch
<i>Astragalus miser</i> Dougl. ex Hook.	Timber milk-vetch
<i>Astragalus robbinsii</i> (Oakes) A. Gray	Robbins' milk-vetch
? <i>Hedysarum</i>	
<i>Lupinus arcticus</i> S. Wats.	Arctic lupine
<i>Medicago sativa</i> L.	Alfalfa
<i>Oxytropis monticola</i> A.Gray (= <i>O. campestris</i>)	Mountain locoweed
<i>Trifolium hybridum</i> L.	Alsike clover
<i>Trifolium pratense</i> L.	Red clover

<i>Trifolium repens</i> L.	White clover
<i>Vicia americana</i> Muhl. ex Willd.	American vetch
GENTIANACEAE	
<i>Gentiana</i>	Gentian
<i>Gentianella amarella</i> (L.) Borner	Northern gentian
GROSSULARIACEAE	
<i>Ribes hudsonianum</i> Richards. in Frankl.	Northern blackcurrent
<i>Ribes lacustre</i> (Pers.) Poir. in Lamarck	Black gooseberry
?HALORAGACEAE	
<i>?Myriophyllum</i>	
HIPPURIDACEAE	
<i>Hippuris vulgaris</i> L.	Common mare's tail
HYDROPHYLLACEAE	
<i>Phacelia sericia</i> (Grah.) A. Gray	Silky phacelia
LAMIACEAE	
<i>Mentha arvensis</i> L.	Field mint
LENTIBULARIACEAE	
<i>Utricularia minor</i> L.	Lesser bladderwort
LINACEAE	
<i>Linum perenne</i> L.	Western blue flax
MENYANTHACEAE	
<i>Menyanthes trifoliata</i> L.	Buckbean
NYMPHAEACEAE	
<i>Nuphar polysepalum</i> Engelm.	Rocky Mountain cow-lily
ONAGRACEAE	
<i>Epilobium angustifolium</i> L.	Fireweed
<i>Epilobium ciliatum</i> Raf.	Purple-leaved willowherb
PARNASSIACEAE	

<i>Parnassia fimbriata</i> Konig	Fringed grass-of-Parnassus
<i>Parnassia palustris</i> L.	Northern grass-of-Parnassus
PLANTAGINACEAE	
<i>Plantago major</i> L.	Common plantain
POLEMONIACEAE	
<i>Polemonium pulcherrimum</i> Hook.	Showy Jacob's ladder
POLYGONACEAE	
<i>Polygonum amphibium</i> L.	Water smartweed
<i>Polygonum douglasii</i> Greene	Douglas' knotweed
<i>Polygonum viviparum</i> L.	Alpine bistort
<i>Rumex occidentalis</i> S. Wats.	Western dock
PRIMULACEAE	
<i>Androsace septentrionalis</i> L.	Northern fairy-candelabra
RANUNCULACEAE	
<i>Actaea rubra</i> (Ait.) Willd.	Baneberry
<i>Anemone multifida</i> Poir.	Cut-leaved anemone
<i>Anemone parviflora</i> Michx.	Northern anemone
<i>Aquilegia formosa</i> Fisch. in DC.	Red columbine
<i>Ranunculus acris</i> L.	Meadow buttercup
<i>Ranunculus aquatilis</i> L.	White water-buttercup
<i>Ranunculus flammula</i> L.	Lesser spearwort
<i>Ranunculus gmelinii</i> DC.	Small yellow water-buttercup
<i>Ranunculus sceleratus</i> L.	Celery-leaved buttercup
<i>Thalictrum occidentale</i> A. Gray	Western meadowrue
<i>Thalictrum venulosum</i> Trel.	Veiny meadowrue
RHAMNACEAE	
<i>Ceanothus velutinus</i> Dougl. ex Hook.	Snowbrush
ROSACEAE	
<i>Amelanchier alnifolia</i> (Nutt.) Nutt.	Saskatoon
<i>Fragaria vesca</i> L.	Wood strawberry
<i>Fragaria virginiana</i> Duch.	Wild strawberry
<i>Geum macrophyllum</i> Willd.	Large-leaved avens
<i>Geum triflorum</i> Pursh	Old man's whiskers
<i>Potentilla anserina</i> L.	Silverweed
<i>Potentilla arguta</i> Pursh	White cinquefoil
<i>Potentilla diversifolia</i> Lehm.	Diverse-leaved cinquefoil

<i>Potentilla gracilis</i> Dougl.	Graceful cinquefoil
<i>Potentilla hippiana</i> Lehm.	Woolly cinquefoil
<i>Potentilla palustris</i> (L.) Scop.	Marsh cinquefoil
<i>Potentilla ? uniflora</i> Ledeb.	One-flowered cinquefoil
<i>Rosa acicularis</i> Lindl.	Prickly rose
<i>Rubus arcticus</i> L.	Nagoonberry
<i>Rubus idaeus</i> L.	Red raspberry
<i>Sanguisorba canadensis</i> L.	Sitka burnet
<i>Sibbaldia procumbens</i> L.	Sibbaldia
<i>Spiraea betulifolia</i> Pall.	Birch-leaved spirea

RUBIACEAE

<i>Galium boreale</i> L.	Northern bedstraw
<i>Galium trifidum</i> L.	Small bedstraw
<i>Galium triflorum</i> Michx.	Sweet-scented bedstraw

SALICACEAE

<i>Populus balsamifera</i> L.	Balsam poplar
<i>Populus tremuloides</i>	Trembling aspen
<i>Salix arbusculoides</i> Anderss.	Northern bush willow
<i>Salix arctica</i> Pallas	Arctic willow
<i>Salix barclayi</i> Anderss.	Barclay's willow
<i>Salix bebbiana</i> Sarg	Bebb's willow
<i>Salix brachycarpa</i> Nutt.	Short-fruited willow
<i>Salix candida</i> Fluegge ex. Willd.	Hoary willow
<i>Salix drummondiana</i> Barratt ex Hook.	Drummond's willow
<i>Salix glauca</i> L.	Grey-leaved willow
<i>Salix planifolia</i> Pursh	Tea-leaved willow
<i>Salix sitchensis</i> Sanson ex Bong.	Sitka willow
<i>Salix</i> spp.	Unidentified willows

SAXIFRAGACEAE

<i>Heuchera cylindrica</i> Dougl. ex Hook.	Round-leaved alumroot
<i>Mitella</i> sp.	Mitrewort
<i>Saxifraga bronchialis</i> L.	Spotted saxifrage
<i>Saxifraga occidentalis</i> S. Wats.	Western saxifrage

SCROPHULARIACEAE

<i>Castilleja miniata</i> Dougl. ex Hook.	Scarlet paintbrush
<i>Collinsia parviflora</i> Dougl. ex. Lindl.	Small-flowered blue-eyed Mary
<i>Mimulus guttatus</i> Fisch. ex DC.	Yellow monkey-flower
<i>Pedicularis bracteosa</i> Benth. in Hook.	Bracted lousewort
<i>Penstemon fruticosus</i> (Pursh) Greene	Shrubby penstemon
<i>Penstemon procerus</i> Dougl. ex Graham	Small-flowered penstemon
<i>Rhinanthus minor</i> L.	Yellow rattle
<i>Veronica</i>	

VALERIANACEAE

<i>Valeriana dioica</i> L.	Marsh valerian
<i>Valeriana sitchensis</i> Bong.	Sitka valerian

VIOLACEAE

<i>Viola adunca</i> J.E. Smith in Rees	Early blue violet
<i>Viola canadensis</i> L.	Canada violet
<i>Viola renifolia</i> A. Gray	Kidney-leaved violet

MONOCOTYLEDONS

CYPERACEAE

<i>Carex aquatilis</i> Wahlenb.	Water sedge
<i>Carex aurea</i> Nutt.	Golden sedge
<i>Carex canescens</i> L.	Grey sedge
<i>Carex capillaris</i> L.	Hairlike sedge
<i>Carex capitata</i> L.	Capitate sedge
<i>Carex concinna</i> R. Br.	Low northern sedge
<i>Carex concinnoides</i> Mack.	Northwestern sedge
<i>Carex disperma</i> Dewey	Soft-leaved sedge
<i>Carex garberi</i> Fern.	Garber's sedge
<i>Carex gynocrates</i> Wormsk. ex Drej.	Yellow bog sedge
<i>Carex lanuginosa</i> Michx.	Woolly sedge
<i>Carex leptalea</i> Wahlenb.	Bristle-stalked sedge
<i>Carex media</i> R. Br. in Richards.	Scandinavian sedge
<i>Carex nigricans</i> C.A. Meyer	Black alpine sedge
<i>Carex pachystachya</i> Cham. ex Steud.	Thick-headed sedge
<i>Carex petasata</i> Dewey	Pasture sedge
<i>Carex saxatilis</i> L.	Russet sedge
<i>Carex utriculata</i> Boott in Hook.	Beaked sedge
<i>Carex</i> spp.	unidentified sedges
<i>Eleocharis palustris</i> (L.) Roem. & Schult.	Common spike-rush
<i>Kobresia myosuroides</i> (Vill.) Fiori & Paol.	Bellard's kobresia
? <i>Scirpus</i>	
<i>Trichophorum caespitosum</i> (L.) Hartm.	Tufted clubrush

IRIDACEAE

<i>Sisyrinchium montanum</i> Greene	Mountain blue-eyed grass
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JUNCACEAE

<i>Juncus balticus</i> Willd.	Baltic rush
<i>Juncus tenuis</i> Willd.	Slender rush
<i>Luzula parviflora</i> (Ehrh.) Desv.	Small-flowered woodrush
<i>Luzula spicata</i> (L.) DC.	Spiked woodrush

LILIACEAE

Allium cernuum Roth in Roem.
Smilacina stellata (L.) Desf.
Zygadenus venenosus S. Wats.

Nodding onion
 Star-flowered false Solomon's seal
 Meadow death-camas

ORCHIDACEAE

Amerorchis rotundifolia (Banks ex Pursh) Hult.
Corallorhiza trifida Chatelain
Goodyera oblongifolia Raf.
Listera cordata (L.) R. Br. in Ait.
Plantanthera dilatata (Pursh) Lindl. ex. Beck
Plantanthera hyperborea (L.) Lindl.
Plantanthera stricta Lindl.
Spiranthes romanzoffiana Cham.

Round-leaved orchis
 Yellow coralroot
 Rattlesnake-plantain
 Heart-leaved twayblade
 White bog orchid
 Green-flowered bog orchid
 Slender bog-orchid
 Hooded ladies' tresses

POACEAE

Agrostis scabra Willd.
Alopecurus aequalis Sobol.
 ?*Arctagrostis latifolia* (R. Br.) griseb. in Ledeb.
Bromus anomalus Rupr. ex Fourn.
Bromun carinatus Hook. ex Arn.
Bromus ciliatus L.
Bromus inermis Leys.
Calamagrostis canadensis (Michx.) Beauv.
Calamagrostis purpurascens R. Br. in Richards.
Calamagrostis rubescens Buckl.
Calamagrostis stricta (Timm) Koel.
Cinna latifolia (Trevir. ex Gopp.) Griseb. in Ledeb.
Danthonia intermedia Vasey
Danthonia spicata (L.) Beauv. ex Roem. & Schult.
 ?*Deschampsia elongata* (Hook.) Munro ex Benth.
Elymus spicata (Pursh) Gould
Elymus trachycaulus (Link) Gould in Shinners
Festuca occidentalis Hook.
Festuca saximontana Rydb.
Glyceria ? elata (Nash.) M.E. Jones
Glyceria grandis S. Wats. ex A. Gray
Glyceria striata (Lam.) A.S. Hitchc.
Hierochloa odorata (L.) Beauv.
Hordeum jubatum L.
Koeleria macrantha (Ledeb.) J.A. Schultes f.
Oryzopsis asperifolia Michx.
Phleum alpinum L.
Phleum pratense L.
Poa alpina L.
Poa cf. cusickii Vasey
Poa glauca Vahl
Poa cf. palustris L.
Poa pratensis L.

Hair bentgrass
 Little meadow-foxtail
 Polargrass
 Nodding brome
 California brome
 Fringed brome
 Smooth brome
 Bluejoint
 Purple reedgrass
 Pinegrass
 Slimstem reedgrass
 Nodding wood-reed
 Timber oatgrass
 Poverty oatgrass
 Slender hairgrass
 Bluebunch wheatgrass
 Slender wheatgrass
 Western fescue
 Rocky Mountain fescue
 Tall mannagrass
 Reed mannagrass
 Fowl mannagrass
 Common sweetgrass
 Foxtail barley
 Junegrass
 Rough-leaved rice grass
 Alpine timothy
 Common timothy
 Alpine bluegrass
 Cusick's bluegrass
 Glaucous bluegrass
 Fowl bluegrass
 Kentucky bluegrass

<i>Poa secunda</i> J.S. Presl. in C.B. Presl.	Sandberg bluegrass
<i>Poa cf. wheeleri</i> Vasey	Wheeler's bluegrass
<i>Schizachne purpurascens</i> (Torr.) Swallen	False melic
<i>Stipa nelsonii</i> Scribn.	Columbian needlegrass
<i>Stipa richardsonii</i> Link	Spreading needlegrass
<i>Trisetum spicatum</i> (L.) Richt.	Spike trisetum

POTAMOGETONACEAE

<i>Potamogeton cf. crispus</i> L.	Curled pondweed
<i>Potamogeton</i> sp.	

SPARGANIACEAE

<i>Sparganium angustifolium</i> Michx.	Narrow-leaved bur-reed
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BRYOPHYTES AND LICHENS

MOSESSES

Aulacomnium palustre
Brachythecium
Brachythecium albicans
Bryum caespiticium
Bryum spp.
Calliergon
Ceratodon purpureus
Climacium dendroides
Dicranum fuscescens
Dicranum scoparium
Drepanocladus vernicosus
Encalypta rhaptocarpa
Eurhynchium pulchellum
Grimmia pulvinata
Hypnum
Plagiomnium
Pleurozium schreberi
Pohlia nutans
Polytrichum juniperinum
Polytrichum piliferum
Pterygoneurum ovatum
Racomitrium
Sanionia uncinata
Sphagnum
Sphagnum capillifolium
Sphagnum fuscum
Tomenthypnum nitens
Tortula ruralis

LIVERWORTS (HEPATICUS)

Conocephalum conicum

Marchantia polymorpha

Barbilophozia hatcheri

LICHENS

Diploschistes muscorum

Peltigera

Cetraria nivalis

Stereocaulon

Cladonia

Cladonia

Cladonia

Cladina

Coelocaulon
